

*A manual of orchidaceous plants
cultivated under glass in Great ...*

James Veitch & Sons, Veitch (James)
& Sons, Adolphus Henry Kent, Maxwell Tylden Masters

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Vol. I

A MANUAL
OF
ORCHIDACEOUS PLANTS

CULTIVATED UNDER GLASS IN GREAT BRITAIN.

PART X.

GENERAL REVIEW OF THE ORCHIDEÆ.

JAMES VEITCH & SONS,

ROYAL EXOTIC NURSERY, 544, KING'S ROAD, CHELSEA, S.W.

1894.

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DIRECTIONS TO THE BINDER.

The ten parts comprising this work may be most conveniently bound in TWO VOLUMES.

Vol. I should include five parts arranged in the following order, viz:—

Parts X, V, III, VI and II, followed by the Systematic and Alphabetical Indexes of the volume at the end.

Vol. II should also include five parts arranged in the following order, viz:—

Parts IX, I, VIII, VII and IV, followed by the Glossary of Technical Terms, the Systematic and Alphabetical Indexes of the volume, and the *Corrigenda* at the end.

VOL. I.



A MANUAL OF ORCHIDACEOUS PLANTS.

VOL. I.

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A MANUAL OF ORCHIDACEOUS PLANTS

CULTIVATED UNDER GLASS IN GREAT BRITAIN.

VOL. I.

EPIDENDREÆ.

JAMES VEITCH & SONS,
ROYAL EXOTIC NURSERY, 544, KING'S ROAD, CHELSEA, S.W.

1887—94.

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PREFACE.

THIS Manual has been compiled to supply amateurs and cultivators of exotic Orchids with a fuller account of the principal genera, species and varieties cultivated under glass, than is contained in the Manuals hitherto in use.

The rapid extension of Orchid culture during the last quarter of a century, resulting from the increased taste for and appreciation of this beautiful and interesting order of plants, has created the *desideratum* which we have now attempted to supply. The prominent place, too, occupied by Orchids in the columns of the Horticultural Press, and the amount of practical and varied information respecting them disseminated through its agency, has also stimulated the desire to obtain all the leading facts in a condensed form, to which easy reference may at any time be made.

So numerous are the species and varieties of Orchids at present in cultivation, and to which additions are constantly being made by new discoveries and by artificial hybridisation, that the labour attending the compilation of a Manual sufficiently comprehensive to meet the wants of cultivators has necessarily taken up much time. Moreover, the unsatisfactory state of Orchidology, especially in its horticultural aspect at the time this Manual was commenced, and its complicated and unscientific nomenclature, have rendered its compilation within a stated time almost an impossibility.

Under these circumstances we decided upon issuing the work in parts, each part containing a monograph of the cultivated species and varieties of one of the most important genera, or of a group of genera. The parts were issued according

as the materials which came to hand enabled us to complete each, as far as practicable, without reference to their systematic order of sequence. This has necessarily deranged the paging of the whole work, but with the aid of the systematic and alphabetical indexes to the genera appended to each volume, little inconvenience will, it is hoped, be experienced in finding any of the described species.

Little explanation of the plan of the work is here needed ; we have only to state that in the scientific classification and sequence of the genera we have followed, with but trifling deviations, the arrangement of Bentham and Hooker as elaborated in their *Genera Plantarum*, the most profound and, at the same time, the most intelligible exposition of the Orchideæ extant. In the nomenclature of the species we have adhered to the Laws of Botanical Nomenclature adopted by the International Botanical Congress, held at Paris in August, 1867.

In the description of the species, we have been compelled to use occasionally a few technical terms; at the end of the second volume we have given a glossary of the terms so used. In the cultural notes we have quoted temperatures in the Centigrade scale with the equivalent Fahrenheit readings, in the hope that the far more rational scale, now almost universally adopted in scientific investigations, may also come into use in horticulture. The literary references in italics indicate coloured plates of the species or variety described.

We gratefully acknowledge our deep obligations to the numerous patrons and friends who have with untiring kindness supplied us with materials for description and illustration of rare and little known kinds, without which the issue of this work in its present form would have been impossible. The various sources from which these materials

have been derived are duly noted in their respective places. The determination of the correct nomenclature of very many species has necessitated constant reference to the original types preserved in the National Herbaria. To the heads of these departments an especial acknowledgment is due, and we tender our warmest thanks to Mr. W. T. Thiselton Dyer, Director of the Royal Gardens at Kew, and to Mr. J. G. Baker, the Keeper of the Herbarium, and his assistants; also to Mr. W. Carruthers, of the Natural History Museum, South Kensington, and to his staff, for their unremitting kindness and assistance in enabling us to inspect the herbarium specimens under their charge, by which many perplexing questions of nomenclature have been definitely settled. We also gladly acknowledge our indebtedness to Dr. Maxwell T. Masters for his article on the Teratology of Orchids and for his assistance in the preparatory notes on the minute anatomy of the leaves. And we must gratefully recognise the unremitting care which our assistant Mr. A. H. Kent has bestowed on the preparation of this work.

JAMES VEITCH & SONS

ROYAL EXOTIC NURSERY, CHELSEA.

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GLOSSARY OF TECHNICAL TERMS.

Acropetal or **basifugal** order, applied to flowers produced in succession from a common axis, of which the youngest is nearest the apex as in *Oncidium Papilio*, *Masdevallia Chimera* and other Saccolabiate Masdevallias, *Cypripedium Chamberlainianum* and nearly all the Cypripedes in the section **SELENIPEDIA**.

Acuminate, tapering to a point.

Acute, terminating in a sharp point.

Adnate, adherent, applied to unlike organs as the column and lip in *Epidendrum*; the base of the sepals and the foot of the column in *Dendrobium*, *Bulbophyllum*, etc.

Anastomosing, said of veins which sub-divide and join each other as those in the upper sepal of many Cypripedes.

Amplexicaul, applied to leaves that embrace the stem at their base like those of *Dendrobium formosum*, and many others.

Ancipitous, two-edged as the pseudo-bulbs of *Trichopilia*, many *Oncids*, *Odontoglossa*, etc.

Annulate, surrounded with raised narrow bands or rings as the fleshy stems of *Phaius*, *Chysis*, *Mormodes*, *Cynoches*, etc.

Anatropous, applied to ovules that are turned down upon themselves so that the true apex points to the base. See Fig. 10, page 87.

Auriculate, having small rounded lobes or ears as the small basal lobes of the labellum of many *Oncidiums*.

Bibracteate, having two opposite bracts of which one is usually larger than the other as in *Cypripedium callosum*, *C. niveum*, etc.

Bicalcarate, having two spurs.

Bicuspidate, having two horn-like points as the staminode of *Cypripedium barbatum*, *C. Lawrenceanum* and closely allied species.

Bifid, divided into two from the middle upwards.

Bilamellate, applied to the crest of the labellum of *Brassia*, *Odontoglossum*, etc., when it consists of two small vertical plates.

Calceolate, calceiform, having the form of a slipper as the labellum of *Cypripedium*, *Dendrobium moschatum*, *D. Chrysocrepis*, etc.

Campanulate, bell-shaped.

Capsule, the seed vessel.

Carinate, having a keel or raised line.

Caudicle, the extension of the smaller end of a pollen-mass into a tail-like point as in most of the OPHRYDEÆ, in *Calanthe*, *Eria* and a few others. See Morphology, Fig. B, page 22.

- Cauline, belonging to the ascending axis or stem.
- Cespitose, growing in tufts or patches.
- Ciliate, fringed with hairs as the petals of many Cypripedes.
- Ciliolate, fringed with very short soft hairs.
- Cirri, small thread-like organs more or less spirally twisted as the apical appendages of the labellum of *Phalenopsis amabilis* and *P. Aphrodite*, of the column of *Odontoglossum cirrosum*, etc.
- Clavate, club-shaped, gradually thickening from below upwards as the stems of many Cattleyas, Dendrobiums, etc.
- Clinandrium, the chamber at the top of the column in which the pollinia lie.
- Complicate, folded, of leaves in part only.
- Conduplicate, folded longitudinally down the middle the whole length.
- Connate, said of leaves when the bases of two opposite ones are united as in the common Honeysuckle, but in Orchidology it is often applied to two like organs that have grown together along their sides as the lateral sepals in Cypripedium, Masdevallia, many Oncidiums, etc.
- Connivent, nearly synonymous with convergent, applied to organs that are gradually turned towards each other as the lateral sepals of many Cattleyas.
- Cordate, heart-shaped, when the base of the leaf, foliage or floral, is in the form of two rounded lobes and the apex is pointed, like the hearts of a pack of cards. Cordate-ovate, intermediate between cordate and ovate.
- Cordate-oblong, longer and less tapering than cordate.
- Corymbose, corymbiform, expresses a modification of the raceme in which the pedicels are gradually shorter towards the summit, as in *Calanthe veratrifolia* and allied species, the Amphiglottide Epidendra, etc.
- Crenulate, said of leaves, whether foliage or floral, when the edge has rounded teeth and sharp angles between them as the labellum of *Aerides japonicum*.
- Cucullate, hooded; the apex of the column of many Oncids and species of allied genera is prolonged into a membranous or petaloid appendage, often turned inwards and resembling a hood.
- Cuneate, wedge-shaped, tapering towards the base.
- Cymbiform, having the form of a boat, as the hypochile of some species of Stanhopea.
- Decurrent, applied to leaves the blade of which is continued down the stem into a kind of foliaceous wing; also to any organ prolonged downwards beyond the point of insertion.
- Deltoid, of the shape of the Greek letter delta Δ.
- Denticulate, having small marginal teeth.
- Dialysis, the converse of connate; when two like organs which normally occur joined together, become separated.

- Digitate, finger-like, usually applied to parts that radiate from a common centre on one side only.
- Dichotomous, branching in pairs like the panicle of *Dendrobium teretifolium*.
- Diphyllous, applied to pseudo-bulbs and stems which produce two leaves at their apex.
- Distichous, arranged in two rows on opposite sides of the stem as the leaves of *Vanda*, *Aërides*, *Dendrobium*, etc.
- Dolabriform, axe-shaped, having one margin straight and thick and the opposite one enlarged, rounded and thin.
- Emarginate, applied to leaves, both foliage and floral, which have a shallow notch at the apex.
- Eusiform, straight and narrow with the point acute like the blade of a sword.
- Epichile. See *Stanhopea*, p. 109.
- Equitant, applied to leaves that are folded one over the other at their base as those of many *Cymbidiums*, *Aërides*, *Vandas*, etc.
- Erose, having the margin irregularly toothed as if gnawed by an insect, like the labellum of *Odontoglossum Cervantesii*.
- Falcate, curved like a reaper's sickle.
- Filiform, thread-like.
- Fimbriate, fringed by fine divisions of the margin as the labellum of *Lycaste lanipes*, *Dendrobium fimbriatum*; the petals of *D. Harveyanum*, etc. In the labellum of *D. Brymerianum* the fimbriation is excessively developed and much branched.
- Foliaceous, leaf-like, having the texture and appearance of leaves.
- Fusiform, spindle-shaped, tapering towards each end like the stems of many of the Aulizicum Epidendra.
- Galeate, helmet-shaped.
- Gibbous, with a short obtuse swelling.
- Glabrous, smooth, quite destitute of hairs.
- Hastate, halberd-shaped, having two lobes nearly at right angles to the petiole or claw.
- Hispid, Hispidulous, covered with short stiff hairs.
- Hypochile. See *Stanhopea*, p. 109.
- Imbricating, overlapping like the tiles of a roof.
- Infundibuliform, funnel-shaped.
- Involute, when the lateral margins of an organ (sepal, petal, etc.) are rolled inwards over the blade.
- Lacinia, the divisions of a leaf, whether foliage or floral, when acute and separated by an acute sinus as the side lobes of the labellum of many *Cœlogynes*, *Cymbidiums*, etc.

- Lamina, the flat expanded part of a leaf or floral segment.
Ligulate, strap-shaped, narrow and moderately long.
Limb, as Lamina, but applied to the floral segments only.
Lanceolate, when the blade is broadest in the middle and diminishes insensibly towards each end. The true lanceolate form is three or four times as long as broad.
Linear, narrow with the edges parallel. Linear-lanceolate, narrower than lanceolate. Linear-oblong, narrower than oblong.
Micropyle, the pore or opening in the ovule through which the pollen tubes enter.
Monophyllous, applied to pseudo-bulbs and stems which produce but one leaf at their apex.
Mesochile. See Stanhopea, p. 109.
Mucronate, abruptly terminated by a sharp hard point.
Obovate, the converse of cordate, narrow at the base and terminating in two rounded lobes; but in the ORCHIDÆ an obovate blade is usually apiculate or pointed at the apex as the labellum of *Brassia Gireoudiana*.
Oblanceolate, the converse of lanceolate, broader between the middle and the apex. Oblanceolate-oblong, intermediate between oblong and oblanceolate.
Oblong, the sides parallel and nearly straight, two or three times as long as broad.
Obovate, the converse of ovate.
Ovate, egg-shaped in outline, one and a half to twice as long as broad. Ovate-oblong, intermediate between ovate and oblong, broadest near the base.
Panduriform, fiddle-shaped, of obovate form with two recesses on each side as in the labellum of *Oxalidaceae pandurata*, many Oncids and Odontoglossums, etc.
Panicle, Panicle, branched, applied to the inflorescence only.
Papillæ, minute epidermal "up-risings" or glandular asperities on the surface.
Papillose, covered with papille as the sepals and lip of many Masdevallias.
Pectinate, arranged like the teeth of a comb.
Pedicel, the lateral or secondary flower-stalk of a raceme or panicle.
Perianth, the series of floral segments that surrounds the sexual organs. In orchidology it is sometimes restricted to the lower whorl or sepals as they are conventionally called.
Petiolate, applied to leaves having a footstalk, in contradistinction to sessile said of leaves in which the footstalk is absent.
Petiole, the footstalk of a leaf.
Placentation, parietal and axile. See Cypripedium, p. 5 (foot-note).

Pyriform, pear-shaped.

Quadruplicate, divided into four lobes as the labellum of the Amphiglottide Epidendra.

Raceme, an inflorescence in which the flowers are arranged on pedicels along an undivided axis.

Racemed, Racemose, in the form of a raceme.

Rachis, the axis or stem of an inflorescence.

Retuse, obtuse with a slight depression at the apex.

Reniform, kidney-shaped.

Rhomboidal, approaching four-sided with rounded angles as the petals of *Phalaenopsis amabilis*, *P. Aphrodite*, *P. Schilleriana*, etc.

Revolute, rolled backwards, applied to leaves, sepals, petals, etc., that have their margins rolled back under the blade.

Saccate, having a depression in the form of a bag or pouch as the labellum of *Saccobium*.

Scandent, climbing, rising by the aid of neighbouring bodies and attaching itself to them like the stems of *Vanda teres*, *V. Hookeriana*, *Sarcocilus (Camarotis) purpurea*, etc.

Scape, in the ordinary acceptance of the term is the naked peduncle which rises from the crown of many bulbous plants as the Tulip, Hippeastrum, etc. In orchidology it is generally applied to peduncles that spring from the base of pseudo-bulbs as in *Odontoglossum*, *Oncidium*, *Miltonia*, etc.*

Scarious, dry and membranous.

Sepaline, belonging to the sepals as the tube and tails of *Masdevallia*.

Secund, having the flowers all turned in one direction as those of *Angraecum citratum*, *Rodriguezia secunda*, etc.

Serrate, Serrulate, notched like the teeth of a saw.

Sinuate, having the margin alternately convex and concave.

Spathaceous, resembling the spathe or floral bract of Aroids.

Spathulate, narrow at the base, broader and rounded at the apex.

Staminode. See *Cypripedium*, p. 7.

Stellate, rayed like a star.

Stipes, the strap-like prolongation of the gland or removable disk of the rostellum that support the pollinia in VANDEE. See Morphology, p. 29.

Subpandurate, approaching pandurate or fiddle-shaped.

Subulate, awl-shaped, cylindric or nearly so, and terminating in an awl-like point like the minute petals and lip of many Cirrhopetalata.

* The inflorescence of most orchids of whatever form or origin is called a spike by nearly all British cultivators. True spikes are however rarely seen in the cultivated ORCHIDÆ requiring the protection of a glass-house. Instances occur in *Arpophyllum*, *Celia*, *Bulbophyllum*, etc.

Thyrsus, Thyrsoïd, a raceme of oval shape of which the central pedicels are a little longer than the outer ones. This form of inflorescence occurs in *Dendrobium densiflorum*, *D. Farmeri*, *D. thyrsiflorum* and allied species.

Tomentosa, covered with short matted hairs.

Tridentate, terminating in three teeth.

Trigonal, three-angled.

Triquetral, three-edged.

Truncate, terminating abruptly, as if a piece had been cut off.

Trapeziform, having four sides, but the opposite sides not parallel nor the opposite angles equal.

Umbel, an inflorescence in which the pedicels or secondary axes spring from the same point in the peduncle or primary axis and diverge like the rays of a parasol. The umbel and semi-umbel occur in *Cirrhopetalum*, *Bulbophyllum* and a few others.

Unguiculate, applied to floral segments when the blade or limb is narrowed at the base into a short petiole or claw.

Ventricose, bulging or swelling out as the disk of the labellum of *Cycnoches chlorochilon*.

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<i>Burlingtonia</i>	"	<i>Oncidieæ</i>	170
<i>Cochlioda</i>	"	<i>Oncidieæ</i>	187
<i>Colax</i>	"	<i>Cyrtopodieæ</i>	67
<i>Comparettia</i>	"	<i>Oncidieæ</i>	164
<i>Coryanthes</i>	"	<i>Stanhopieæ</i>	103
<i>Cynoches</i>	"	<i>Stanhopieæ</i>	139
<i>Cymbidium</i>	"	<i>Cymbidieæ</i>	10
<i>Cypripedium</i>	"	<i>Cypripedieæ</i>	1
<i>Cyperorchis</i>	"	<i>Cymbidieæ</i>	24
<i>Cyrtopodium</i>	"	<i>Cyrtopodieæ</i>	36
<i>Eriopsis</i>	"	<i>Cyrtopodieæ</i>	71
<i>Eulophia</i>	"	<i>Eulophieæ</i>	1
<i>Galeandra</i>	"	<i>Eulophieæ</i>	5
<i>Gomeza</i>	"	<i>Oncidieæ</i>	127
<i>Grammangis</i>	"	<i>Cymbidieæ</i>	28
<i>Grammatophyllum</i>	"	<i>Cymbidieæ</i>	30
<i>Houletia</i>	"	<i>Stanhopieæ</i>	120
<i>Huntleya</i>	"	<i>Cyrtopodieæ</i>	42
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<i>Promenæa</i>	"	Cyrtopodieæ	42
<i>Renanthera</i>	"	Sarcantheæ	82
<i>Rhynchostylis</i>	"	Sarcantheæ	52
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<i>Zygocolax</i> × ...	-	...	"	Cyrtopodieæ	66

CORRIGENDA.

Under *Masdevallia*.

- Page 32, 18th line from top, for Sely read Selly.
 " 37, 5th " " for margined read marginal.
 " 44, 7th " bottom, for in read on.

Under *Dendrobium*.

- Page 63, 18th line from top, for VIII. read VII.

Under *Cattleya*.

- Page 14, 14th line from top, for in read from.
 " 22, bottom line, for Otterpool read Otterspool.
 " 33, 18th line from bottom, for t. 368-69 read t. 1689.
 " 38, 2nd " top, for 5685 read 5683.

Under *Laelia*.

- Page 62, 19th line from top, for 1885 read 1884.
 " 82, 9th " " for 163 read 173.

Under *Trichocentrum*.

- Page 170, 13th line from top, for R. triquetrum read T. triquetrum.

Under *Cochlioda*.

- Page 189, 6th line from bottom, leave out "the German botanist."

Under *Odontoglossum*.

- Page 4, 11th line from bottom, for Linnean read Linnean.
 " 13, 18th " " for 1846 read 1840.
 " 16, 12th " " for 1847 read 1844.
 " 31, 10th " top, for James read Thomas Dawson.
 " 49, 6th " bottom, for 157 read 1857.
 " 53, 12th " " for candidissimum read candidulum.

Under *Miltonia*.

- Page 105, the woodcut represents *Miltonia Roeszlii* not *M. Roeszlii alba*.
 " 106, 8th line from bottom, for Kegel's read Regel's.

Under *Phalaenopsis*.

- Page 33, 2nd line from top, for Superintendent read Curator.
 " 47, 3rd " " for costa read casta.

Under *Sarcochilus*.

- Page 60, 16th line from bottom, for p. 35 read p. 25.

Under *Augracum*.

- Page 127, 18th line from top, leave out "it is probably now lost to cultivation."
 " 137, 7th " bottom, for Walker read Waller.

Under *Cypripedium*.

- Page 1, 4th line from bottom, for Aspasia read Apostasia.
 " 45, 19th " top, for 1887 read 1888.
 " 64, 10th " " for Im Thurm read Im Thurn.

GENERAL REVIEW

OF THE

ORCHIDEÆ.

MORPHOLOGY OF ORCHID FLOWERS.

"There is no order of plants," writes Dr. Lindley, "the structure of whose flowers is so anomalous as regards the relation borne by the parts of reproduction, or so singular in respect to the form of the floral envelope. Unlike other endogenous plants, the calyx and corolla are not similar to each other in form, texture and colour (as in the Lily, Crocus, Narcissus, Squill, Amaryllis, etc.); neither have they any similitude to the changes of outline that are met with in such irregular flowers as are produced in other families of the Vegetable Kingdom. On the contrary, by an excessive development and singular conformation of one of the petals called the labellum or lip, by irregularities either of form, size, or direction of the other sepals and petals, by the peculiar adhesion of those parts to each other, and by the occasional suppression of a portion of them, flowers are produced so unusual and so grotesque in form that it is no longer with the Vegetable Kingdom that they can be compared, but we are forced to seek resemblances in the animal world."*

Besides the well-known instances of mimicry that occur among our native orchids, as the Bee Orchis, *Ophrys apifera*; the Fly Orchis, *Ophrys muscifera*; the Man Orchis, *Aceras anthropophora*; the Frog Orchis, *Habenaria viridis*; the Bird's Nest Orchis, *Neottia Nidus-avis*, etc., still more striking and conspicuous examples are afforded by species of tropical orchids of which the following are figured in this work:

* English Cyclopaedia, IV., p. 3.

the Butterfly Orchids, *Oncidium Papilio* and *On. Kramerianum*; the Dove Plant, *Peristeria elata*; the Swan Orchid, *Cycnoches pentadactylon*; the Lion's Tongue Orchid, *Masdevallia leontoglossa*; the Moth Orchid, *Phalaenopsis* (several species); and with these may be mentioned on account of their unusual and strange forms *Cryptophoranthus atro*



Butterfly Orchid.
Oncidium Kramerianum.

purpureum, the Window Orchid; *Restrepia antennifera*, *Bulbophyllum barbigerum*, *Cirrhopetalum Thouarsii*, *Odontoglossum cirriforme*, *Oncidium chrysodipterum*, *Caelogyne pandurata*, *Ornithocephalus grandiflorus*, *Stanhopea Warblii*, *Coryanthes macrautha*, *Mormodes Ocarina*, *Graemangis Ellisii*, and very many others.



Dove Plant.
Peristeria elata.



Window Orchid.
Cryptophoranthus atropurpureum.
(*Masdevallia fenestrata.*)



Moth Orchid.
Phalaenopsis Sandriana alta.



Grammangis Ellisii.

But notwithstanding this apparently endless and irreconcileable variety in form, a general plan of floral structure pervades the whole family of orchids that clearly distinguishes it from every other Natural Order of plants. The floral organs like those of all endogenous plants are constructed upon a trimerous (tripartite) type, that is to say—all the parts are in threes or a simple multiple of three; * but owing to the suppression of some, the confluence of others, and various other modifications especially of the sexual organs, the tripartite type, except in the two series of perianth segments, is greatly disguised, but as will be presently pointed out it is almost always present. Irregular as the flowers appear on superficial view, there may always be detected in them a bilateral symmetry, that is to say—all normally developed orchid flowers may, in one direction only, be divided in a monosymmetrical manner or into two equal parts that resemble each other in every particular.† Into whatever form, amidst the almost infinite variety of changes that runs through the whole family, an orchid flower has been moulded, and whatever modification an individual organ may have undergone, the following characters are presented to the naked eye throughout and may be generally recognised without difficulty.

* The anthers only of the theoretical type of orchid flowers are a multiple of three (3×2), but the rudiments of all the six are generally present, as will be shown further on.

† Zygomorphy of the German botanists.

The *flowers* are solitary or produced in racemes or in some modification of the raceme.

In the raceme and its modifications, the *pedicel* is usually very short, the greater part of the length between the base of the footstalk and the base of the column being taken up by the ovary.

The *ovary* is from its position inferior; it is more or less twisted* and one celled with parietal placentation. But in the South American Cypripedes (*Selenipedia*), *Apostasia* and *Neuwiedia*, it is trilocular with axile placentation.

The *perianth* consists of six segments, of which the three outer ones, the *sepals*, are nearly similar and equal, free, or the two lower ones connate (*Cypripedium*) or all three coherent (*Masdevallia*), often less brightly coloured than the three inner ones, of which two, the *petals*, are similar and equal not only to each other but often to the sepals, while the third inner segment, the *labellum*, is very dissimilar, usually much larger and often produced at its base into a spur of variable length; but of whatever form it may always be reduced to a three-lobed type.

The stamens and style are consolidated into a gynostemium or central *column*, at the apex of which the anther or polliniferous apparatus is seated. The peculiar structure of the column will be described under Homologies and Fertilisation.

The pollen-grains are grouped in innumerable numbers into 2, 4, 6 or 8 granular or waxy masses of pyriform, discoid or sub-globose shape called *pollinia* that are stalked in a different manner in the different tribes and are lodged in a chamber called the *clinandrium*; this chamber is two-celled, one-celled by absorption of the septum (dividing wall) or even four-celled by more or less perfect secondary septa. The pollinia are usually accompanied by a strap-shaped appendage to which the general name of *caudicle* has been applied, but which for reasons to be hereafter given can only be retained in a restricted sense.

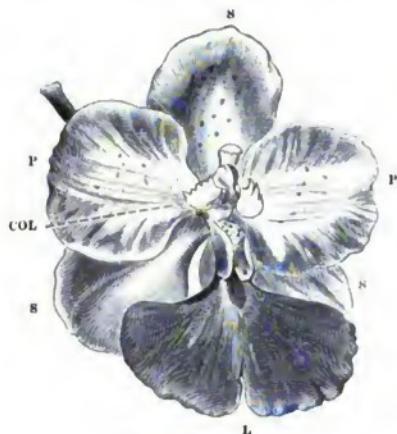
The greatest apparent deviation from the general arrangement of the reproductive organs occurs in *Cypripedium* which is fully described under that genus.†

As this work may be used by many who have never given any attention to Botany and to whom its terminology may to some extent be unintelligible, it seems to be a convenient course to illustrate by a few examples the various parts of an orchid flower in a manner by which the reader will distinguish them at a glance and be enabled to comprehend with ease the general morphology.

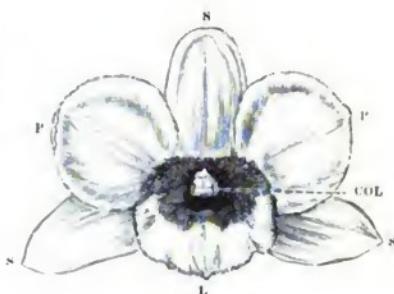
* In many cases the ovary before the expansion of the flower gradually describes an angle of 180°—that is, it turns half way round, whence the flower is inverted.

† *Cypripedium*, page 4. See also *Floral Conformation of the genus Cypripedium*, by Dr. Maxwell T. Masters, in *Journ. Linn. Soc.*, vol. XXII., p. 401.

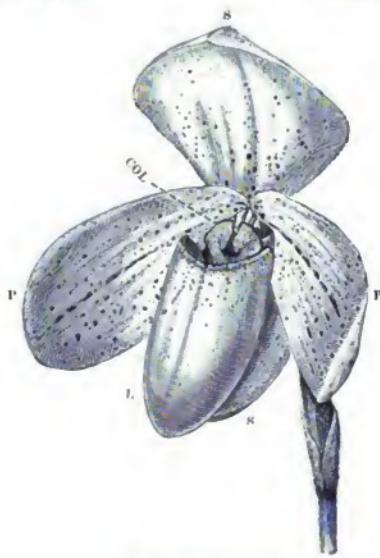
The flowers illustrated have been purposely selected from among the best known epiphytal species in cultivation. In every case s



Odontoglossum citrosum.



Dendrobium Farmeri.



Cypripedium concolor.

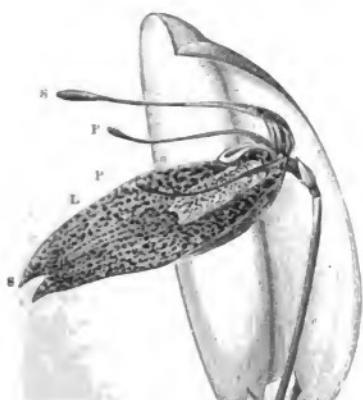
denotes the sepals, P the petals, L the labellum, COL the column, AN the anther, and ST the stigma.



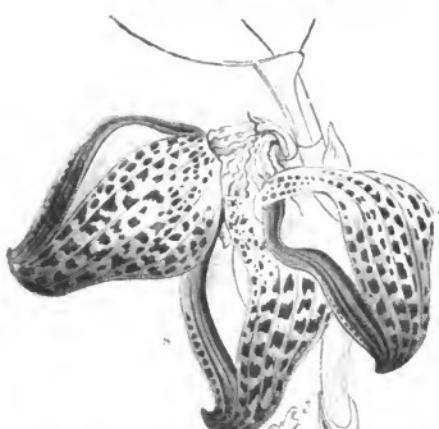
Renanthera coccinea.
With dissimilar dorsal sepal.



Masdevallia leontoglossa.
With sepals united into a tube at their base and
extended into long tails where free.



Restrepia antenniformis.
With thread-like upper sepal and petals and broad
coherent lateral sepals.

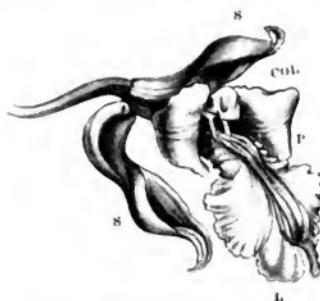


Cryptophoranthus Dayanum.
With sepals cohering at base and apex.

The sepals or outermost series of perianth segments are generally uniform, but numerous deviations from the equality and similarity of the three occur. The most usual deviation is seen in the upper or dorsal sepal, which is often of a different size and shape from the lateral two as in *Renanthera* (type species), *Restrepia*, *Cirrhopetalum*, and many Oncids. In *Masdevallia* the three sepals are united at their bases into a tube and prolonged into slender tails at the free end. In *Rodriguezia* the two lateral sepals form a boat-like body of very curious structure. In *Cryptophoranthus* the two lateral sepals are not only joined together but they cohere to the upper one both at the base and apex, so that the flower never opens, and in *Compartettia* they are produced at their base into a long spur. In *Oncidium Papilio* and the closely allied *On. Kramerianum* the two lateral sepals are not only of very different shape from the upper one but they are more brightly coloured than the petals, an unusual occurrence in *Oncidium*. In *Cypripedium* the two lateral sepals are always joined together into a single blade which, in the Indo-Malayan species, is usually smaller than the upper one. Other deviations are described under the several genera in which they occur.

The equality of the two petals is constant, but great diversity occurs in the part they take in the general aspect of the flower, of which, combined with the labellum, they are often the most conspicuous ornament. But in *Masdevallia*, *Cryptophoranthus*, *Cirrhopetalum* and other genera they are reduced to small insignificant bodies that in *Masdevallia* are often quite concealed within the sepaline tube, while in *Cypripedium Sanderianum*, *C. caudatum*, *C. caricinum* and others they are enormously elongated into ribbon-like tails many inches in length. In the *Filiferae* sub-section of *Cœlogyne* the narrow linear petals are quite a subordinate feature of the flower, but in many of the Cyrtochiloid Oncids they are the most conspicuous parts and much larger than the labellum. The fringed petals of *Dendrobium Harveyanum* are a remarkable exception in that genus, in which these organs are always entire.

The labellum is by far the most important of the perianth segments and it is also the most polymorphous; but into whatever form it has been moulded (and so far as our observations have extended, in no two genera is it exactly alike and it varies also considerably in every large genus), its structure is always such as to secure the greatest efficiency in the part it performs as an aid to the fertilisation of the flower. Throughout the Synopses of the Genera and Species, a large number of illustrations of this wonderful organ is given, so that only some typical forms need here be noted. The labellum is usually attached to the column by a short claw or *unguis* which is sometimes so delicately hinged on it that the blade vibrates on the slightest force being imparted to it, for instance, by a breath of air. A



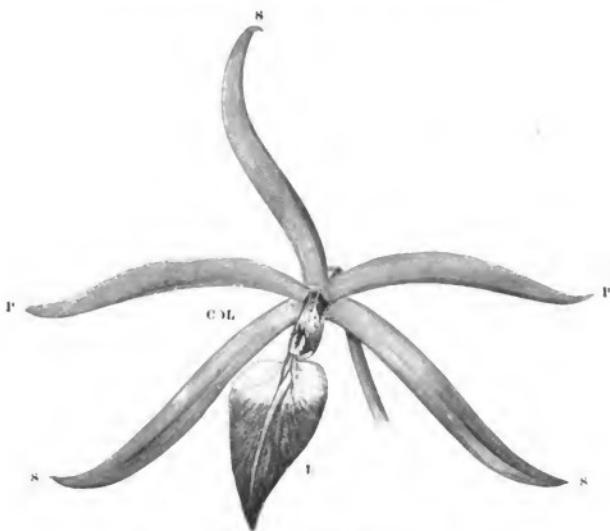
Rodriguezia venusta.
With lower sepals connate into a boat-like body.



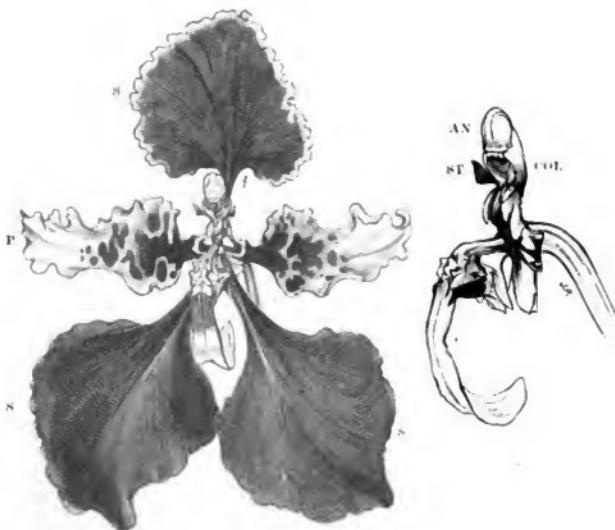
Masdevallia amabilis.
Petals, lip and column concealed within the
sepalin tube S.



Cypripedium caricinum.
With ribbon-like petals.

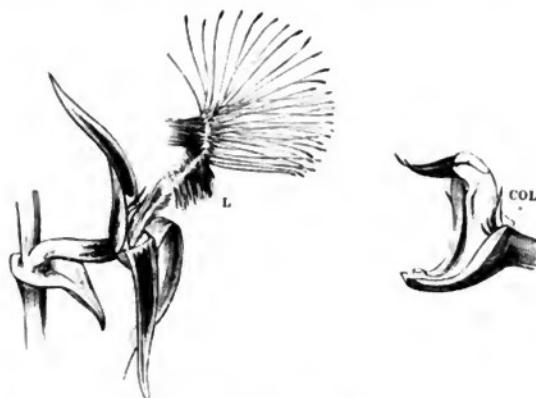


Epidendrum Brassavole.
With similar sepals and petals.

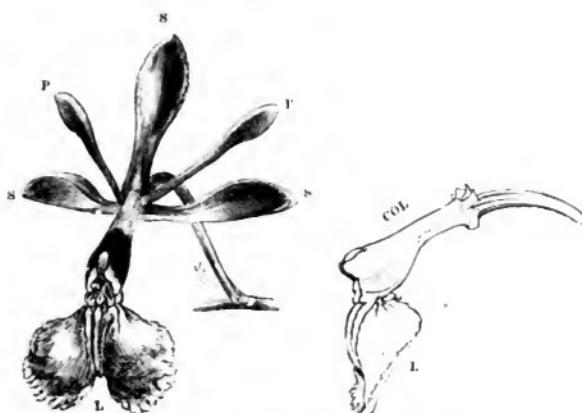


Oncidium chrysolipterum.
With crimped petals and small recurved lip.

remarkable case of this oscillatory motion is afforded by the labellum of *Bulbophyllum barbigerum*; the blade of the lip is also motile in *Cirrhopetalum*, *Arachnanthe*, etc. In *Epidendrum* the claw is more



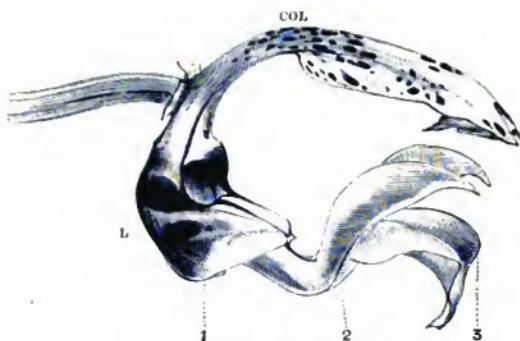
Bulbophyllum barbigerum.
With motile labellum and pedate column.



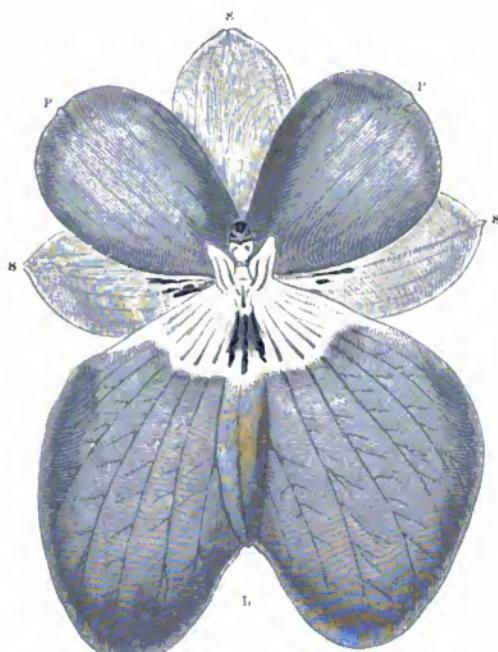
Epidendrum Pseudepidendrum.
With claw of labellum adnate to the column.

or less adnate to the column; in *Odontoglossum* it is simply parallel with it, while in *Oncidium* and many other genera it is at right angles to it.* In *Isochilus*, *Apostasia* and a few other genera we find the

* The relative position of the lip and column affords an important character in distinguishing many of the genera.

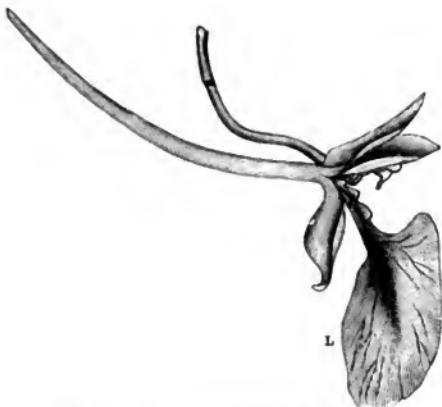


Complex labellum of *Stanhopea Wardii*.
1, hypochile; 2, mesochile; 3, epichile.



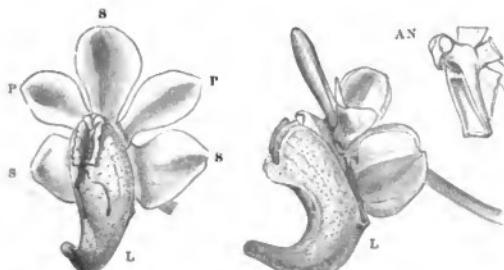
Miltonia vexillaria.
With large flat labellum.

labellum in its simplest form and similar to the petals; in *Coryanthes* and *Stanhopea* on the other hand it is of very complex structure. In many *Masdevallias* it is concealed within the sepaline tube, and in many other species both of that and allied genera it is an inconspicuous part



Spurred labellum of *Comparettia Macroplectron*.

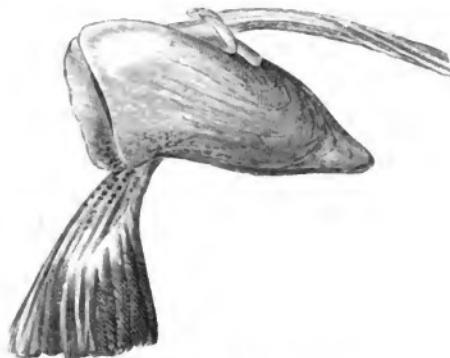
of the flower, while in many Oncids, and especially in *Miltonia*, as *M. vexillaria*, *M. Roezlii* and others, it is dilated into a blade as large as, or larger than all the other segments taken together. In many genera it is prolonged into a slender spur, which in *Angraecum sesquipedale*,



Aerides suavissimum.
With ram's horn-like labellum.

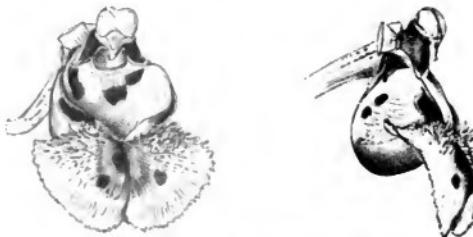
A. Ellisii, *A. caudatum* and others attains an inordinate length; in other genera the spur is more open and takes the form of a funnel, as in *Vanda teres*, *Dendrobium formosum*, *D. longicornu*, or of curved horn-like shape as in *Aerides*. Other remarkable forms of

the labellum occur in *Saccolabium*, in which the basal part is always hollowed out and extends downwards like a small sac; in *Cypripedium* where it appears like a large slipper-like bag and also in several species of *Catasetum*. In nearly all the *Cattleyas* and *Laelias* and also in other genera the basal part of the blade of the labellum is rolled over the column into a tube, while the front part



Funnel-shaped labellum of *Vanda teres*.

or intermediate lobe is often crimped and fringed in a very curious manner. In *Dendrobium Brymerianum*, *Lelia Dightiana* and *Epidendrum (Nanodes) Meduse* the blade is conspicuously fimbriated, in the first-named species very elaborately so, and in these and other genera it is often the most richly coloured of all the floral segments. On the labellum is often developed a fleshy excrescence or callus which in some Oncids

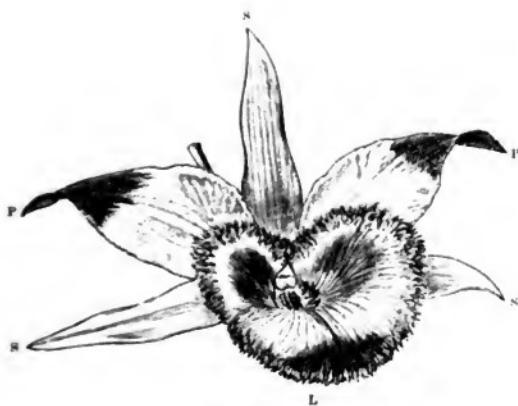


Saccate labellum of *Saccolabium bellinum*.

is of very complex form; in other genera it is reduced to small tubercles or simple keels or raised lines which, in some species of *Odontoglossum* and throughout *Cœlogyne* and *Thunia*, are beautifully fringed. In *Zygopetalum* the crest of the lip is very thick and often curiously furrowed.



Dendrobium Brymerianum.
Labellum with branched fimbriae.



Dendrobium Devonianum.
With fimbriated labellum.



Epidendrum xanthinum.
L. quadripartite labellum with fimbriate lobes.

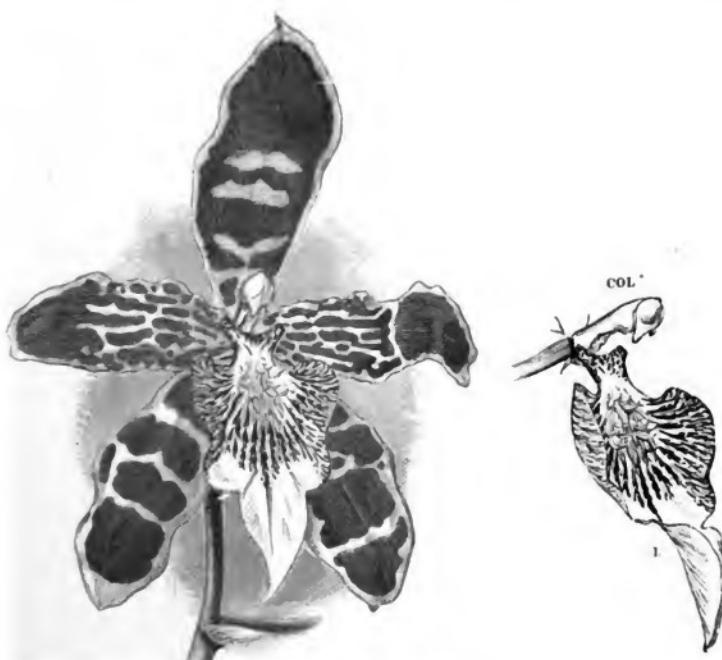


Cypripedium Fairlieanum,
With helmet-shaped labellum.



Cattleya Bowringiana,
With labellum convolute over the column.

The column also varies considerably in form, but except in Cypripedium the deviations from the general type arise chiefly from the enlargement or diminution of the various parts. In Miltonia the column is very short and the wings much reduced; in Oncidium it is also short but much swollen below the stigmatic hollow, and furnished with an ear-like appendage on each side of it, characters that chiefly distinguish Oncidium from the allied genera; in Odontoglossum it is much longer, more slender, and not swollen

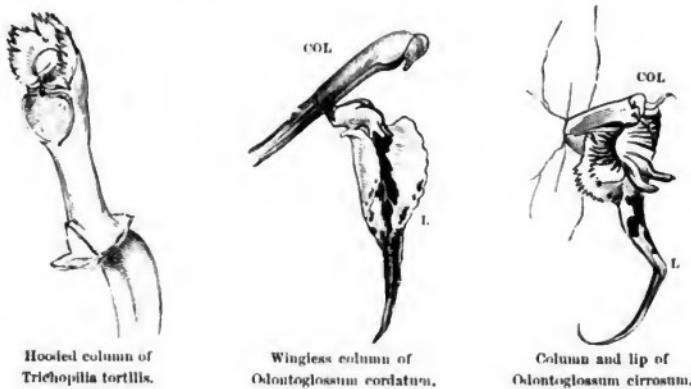


Odontoglossum Harryanum.

With fringed crest.

below the stigma as in Oncidium, wingless in most of the Mexican species, but in others more usually winged, the wings often much lacerated, and some species as *Odontoglossum cirrosum* and *Od. odoratum* prolonged into tendril-like cirri. Prolongation of the column at its apex occurs in *Odontoglossum citrosum*, many Oncids, and throughout Trichopilia; and in other genera the appendage takes the form of a hood, whence the column is said to be hooded or *cucullate*. In *Rodriguezia decora* the apical prolongation takes the form of two

hairy horns of a bright purple colour, and in *Catasetum* it is extended into an acuminate point and produced below the stigma into two bristle-like appendages that are extremely sensitive. In most species

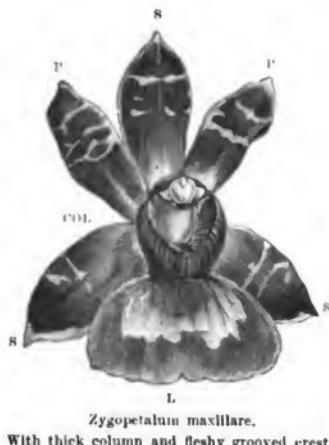


Hooded column of
Trichopilia tortilis.

Wingless column of
Odontoglossum cordatum.

Column and lip of
Odontoglossum cirrosum.

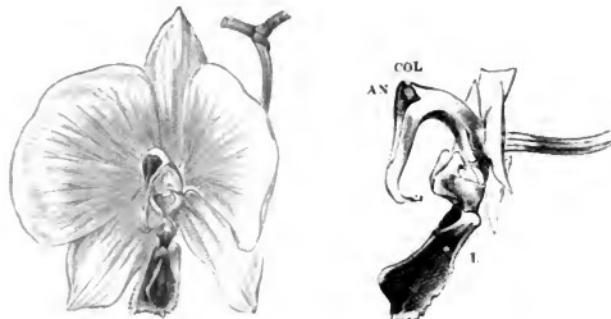
of *Zygotepetalum*, especially those included in the sections *Huntleya* and *Bollea*, the column is excessively broad and thick, equaling in breadth the fleshy crest of the labellum; in strong contrast to this



Zygotepetalum maxillare.
With thick column and fleshy grooved crest.

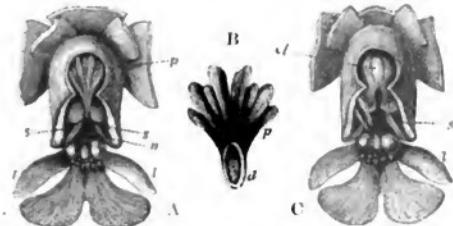
the long slender bent column of the male flowers of *Cycnoches* has a striking resemblance to a swan's neck. Other parts of the column are also subject to modification; the anther is often beaked so that

the column appears to terminate in a process that very much resembles the head and beak of a bird, as in *Phalaenopsis*, *Aerides*, *Peristeria*, etc. Sometimes it is the rostellum or modified stigma that is beaked or elongated in a remarkable way, as in *Ornithocephalus granuliflorus*,



Phalaenopsis Lowii.
With beaked anther.

and many other instances might be quoted to show the almost endless change that pervades nearly every organ of an orchid flower. The column is often concealed by other parts of the flower, by the sepaline tube in *Masdevallia*, by the convolute labellum in many *Cattleyas*



Calanthe Masuca.

A, flower viewed from above with the anther case removed, showing the eight pollen masses in their proper position.

B, pollen masses attached to the viscid disk, seen from the under side.

C, flower in same position as in A, but with the disk and pollen masses removed, showing the now divided rostellum and the empty clinandrium.

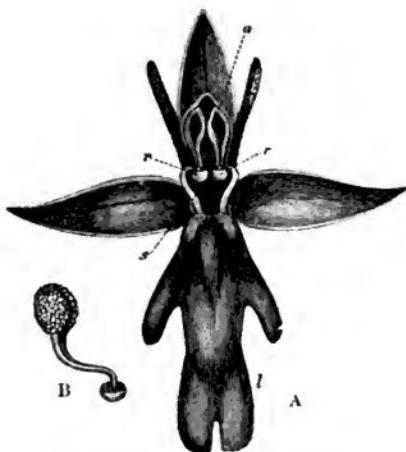
p, pollen masses; s, the two stigmas; n, mouth of spur or nectary; l, labellum; d, viscid disk; cl, clinandrium with pollen masses removed.

(From Darwin's *Fertilisation of Orchids*.)

and *Lelias*; also in *Phaius*, *Thunia*, *Trichopilia*, etc. In many genera the column is more or less produced beyond the point of union with the ovary into a kind of foot as in *Dendrobium*, *Bulbophyllum*, *Aerides*, *Phalaenopsis*, *Maxillaria*, etc.; it then greatly influences the form and

aspect of the flower; the lateral sepals are usually adnate to this prolongation, by which their shape is much modified as in many Dendrobes, and these with the base of the labellum often form a *mentum* or chin-like projection very conspicuous in Bifrenaria, and quite different in structure from the single funnel or spur-like projection of the labellum alone.

The pollinia are 2, 4, 6 or 8; when in fours they are sometimes in two series of two each, and when there are eight they are almost always in two series of four each, of which those in one series are sometimes much smaller than those in the other; this is always the case in hybrids between Cattleya and Laelia. Partial exceptions to the seriate arrangement



Ophrys muscifera (Fly Orchis enlarged).
 a, anther; r, rostellum; s, stigma; l, labellum.
 B, one of the two pollinia with caudicle and viscid disk.
 (From Darwin's *Fertilisation of Orchids*.)

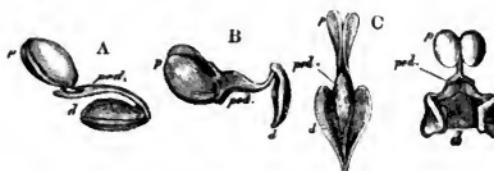
occur in *Sophronitis violacea*, *Calanthe Masuca* (see Fig.) and a few others. The presence of six pollinia is a somewhat rare occurrence; Hexadesmia, Leptotes and Tetramicra are among the best known instances. When in pairs, as throughout the Tribe VANDEÆ, the pollinia are sub-globose or pyriform in shape, but when lying in series as in Cattleya and many other genera in the Tribe EPIDENDRÆ they are usually more or less compressed into a discoid or lenticular shape. In most of our native orchids as Ophrys, Orchis, Habenaria, etc., as well as in exotic genera included in the Tribe OPHRYDÆ as Disa, etc., and also in Calanthe, Eria and a few other tropical genera belonging to the EPIDENDRÆ, the pollen masses are prolonged downwards into a tail-like point that is

firmly attached to a part of the rostellum (the modified stigma) called by Darwin the *cicid disk*; this prolongation is now recognised as the true caudicle of the pollinia.* In *Cattleya* and in some allied genera the pollinia are furnished with a ribbon-like tail formed of a bundle of light elastic threads, and like the pollen masses themselves is included in the anther cell (clinandrium), but is distinct from them. This part of the polliniferous apparatus varies in size and form in the different genera, being sometimes so much reduced as to make its presence difficult to ascertain, while there are instances where it exceeds in bulk the pollinia themselves. For this organ, which is quite distinct from the true caudicle of the OPHRYDEÆ, Mr. Bentham proposed the name *appendicula*. Different both in origin and substance from the *caudicle* of the OPHRYDEÆ and the *appendicula* of the EPIDENDREÆ is the strap-like organ which supports the pollinia of the VANDEÆ, and connects them with the removable disk or so-called gland of the rostellum, and is itself connected with the pollinia by elastic extensible ligaments for which Mr. Darwin has retained the name caudicle. This strap-like appendage is really a double organ, each pollinium being provided with its own appendage, but in most of the genera the two are coherent; in the section LISTROSTACHYS of *Angraecum* and in a few other species they are distinct. This structure also varies much in size and shape in the different genera, being very thin and elongated



Pollinia of *Cattleya labiata*.

A, side; B, front view.



Pollinia of VANDEÆ.

d, viscid disk; ped, pedicel (stipes); p, pollen masses.

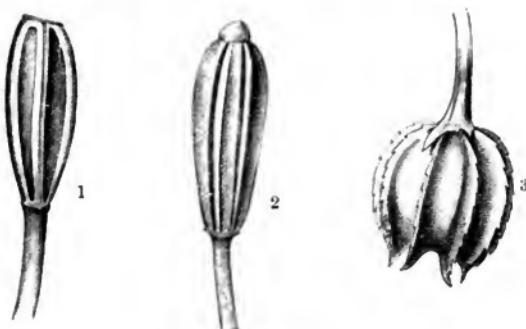
A, of *Odontoglossum grande* after partial depression. B, of *Brassia maculata*.
C, of *Stanhopea saccata* after depression. D, of *Sarcandrus teretifolius*.

(From Darwin's *Fertilisation of Orchids*.)

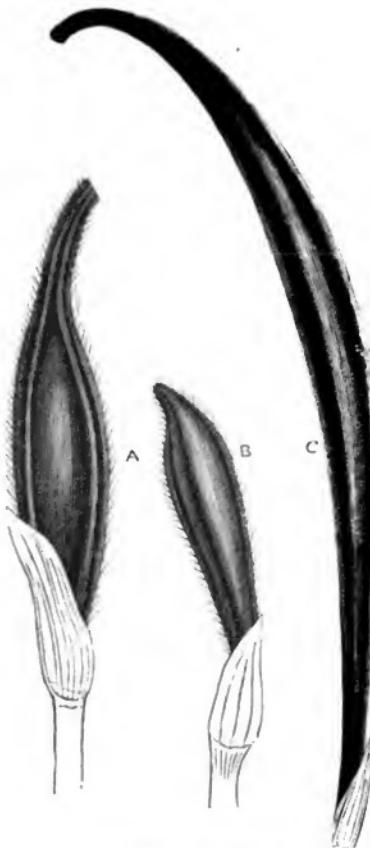
in some of the Phalænopsis and Lycasteæ, much reduced or almost absent in Maxillaria and Zygotetalum, short and strong in some of the true Vandas, thickened in Catastoma, etc. In most of the genera in which it is more or less elongated, it assumes various shapes and changes of position after removal from the clinandrium. Darwin called this organ the pedicel of the rostellum,† but as Bentham afterwards

* See Fig. of *Ophrys muscifera*, B.

† *Fertilisation of Orchids*, p. 181.

Capsules of *Masdevallia*.1, *Veitchiana*. 2, *maculata*. 3, *Chimera*Capsules of *Dendrobium*.A, *formosum*; B, *sureum*; C, *Rhodostoma* x.
(From the *Gardeners' Chronicle*.)

pointed out, although this term is an appropriate one it had already been taken up for a totally different organ, and is universally applied to the footstalk of a flower; he therefore proposed the name



Capsules of *Cypripedium*.
A, *hirsutissimum*; B, *Druri*; C, *caudatum*.
(From the *Gardeners' Chronicle*.)

stipes as being "equally appropriate and without the same inconvenience, for it is generally used as the support of any organ."*

There are three stigmas in every orchid flower, although apparently

* Journ. Linn. Soc. XVIII. p. 286. Through inadvertence arising from long usage of the Lindleyan terminology, the terms applied to the parts of the pollinary apparatus in the text have not been strictly adhered to in the Synopses of the Genera and Species.

but one on superficial inspection; this will be explained in the next section, which is devoted to the homologies of orchid flowers, but without that assistance the presence of all three is easily detected in *Cypripedium*, in which the stigmatic plate is divided into three equal parts by lines diverging from each other at an angle of 120° ; each of these parts represents a stigma and is capable of performing the proper functions of that organ. In the other tribes the lower two of the three are confluent and form the cavity in front of the labellum, in which the pollinia are deposited when the flower is fertilised. The third or upper one is modified into a remarkable organ called the *rostellum*, of which nothing like or analogous to it exists in the flower of any other family of plants. Like the other



Capsule of *Odontoglossum maxillare*.
(From the *Gardeners' Chronicle*.)

Capsule of *Peristeria pendula*,
after dehiscence.
(From the *Gardeners' Chronicle*.)

parts of an orchid flower the rostellum presents "a marvellous amount of diversity of structure in the several tribes."

The capsule or fruit which contains the seed varies greatly in size and form, not only in the different genera, but also in the same genus when it is an extensive one as *Dendrobium*, *Masdevallia* and *Odontoglossum*. The accompanying illustrations will convey an accurate idea of the various forms of some of the capsules.

The surprising diversity in the form and aspect of orchid flowers described in the foregoing pages is still further exemplified in our native orchids, and especially in many Australian and South African genera as *Caladina*, *Corysanthes*, *Dipodium*, *Thelymitra*, *Holothrix*, *Satyrium*, *Pterygodium*, etc., etc.

HOMOLOGIES OF ORCHID FLOWERS.

The perusal of the foregoing outlines of the morphology of orchid flowers may seem somewhat tedious to many readers, and in that case, the following details of their homologies will doubtless seem not less so, but those who desire to comprehend the marvellous structure of orchid flowers and the wonderful contrivances that are to be found in them to secure the end for which they have been created, will not only find the attention required not excessive, but also that when the subject is once fairly grasped, the perusal combined with the examination of fresh specimens will result in pleasure far exceeding that afforded by a cursory view of the most gorgeous or most striking of many remarkable productions in this strange family of plants.

It has already been remarked that notwithstanding the apparently endless and irreconcileable variety of form into which orchid flowers have developed, *a general plan of floral structure pervades the whole family*; this general plan must have had its foundation in some more primitive form than is at present known, and from it all the numerous existing forms are supposed to have been derived. The making out of the structure of this ancestral form or ideal type as it is sometimes called, has exercised the sagacity of many botanists, but the merit of clearly unfolding the homologies of orchid flowers and of interpreting rightly the meaning and functions of the various parts, especially of those that are only now seen in a rudimentary condition, is mainly due to our own distinguished countrymen Dr. Robert Brown* and Mr. Charles Darwin.† To the last-named naturalist we owe the lucid explanation of them in his classical work on the *Fertilisation of Orchids*, and from the chapter especially devoted to the homologies of orchid flowers, the following account of them has been solely derived. We could have wished to have given the eminent naturalist's elucidation of these homologies *in extenso*, but as many details are adduced which our space precludes

* Observations on the Organs and Modes of Fecundation in Orchideæ, 1831, one of the most important papers ever read before the Linnean Society.

† On the Various Contrivances by which British and Foreign Orchids are fertilised by insects (John Murray, 1862), a work that should be read and re-read by every amateur of orchids.

us from reproducing, we are constrained to give all the salient facts in an abbreviated form without, we trust, obscuring their import. In doing so we wish to express our obligations to Mr. Francis Darwin and to the publisher Mr. John Murray, for the kind manner in which they have allowed us to use the diagram from the *Fertilisation of Orchids*, and also other illustrations from the same work which are duly noted in their respective places.

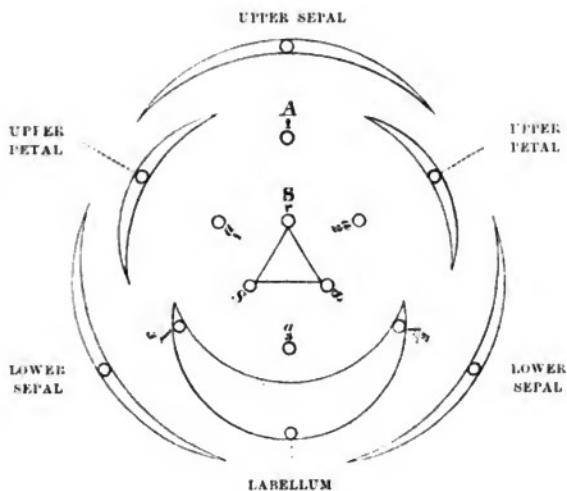
No group of organic beings, Mr. Darwin observes, can be well understood till their homologies have been made out, and in no case is this more applicable than to orchids. The importance of the science of homology rests on its giving us the key-note of the possible amount of difference in plan within any group; it allows us to class under proper heads the most diversified organs; it shows us gradations which would otherwise have been overlooked; it explains many monstrosities; it leads to the detection of obscure and hidden parts or mere vestiges, and shows us the meaning of rudiments. Thus guided, the naturalist sees that all homologous points or organs, however much diversified, are modifications of one and the same ancestral organ; in tracing existing gradations a clue is gained as far as that is possible, in tracing the probable course of modifications during a long line of generations.

The mode of investigation pursued in order to make out these homologies is either by tracing their embryological development when that is possible; or by the discovery of organs in a rudimentary condition; or by tracing through a long series of beings, a close gradation from one part to another until the two parts or organs employed for widely different functions and most unlike each other can be joined by a succession of short links. Applying these methods of investigation to orchid flowers and guided by the general structure of monocotyledonous plants, Dr. Robert Brown first propounded the hypothesis that an orchid flower properly consists of three sepals, three petals, six anthers in two circles or whorls of three each, and of three pistils, one of which is modified into the rostellum. These fifteen organs are arranged as usual alternately three within three in five whorls.

The relative position of all these organs is shown in the following diagram, with the exception of A₂, A₃, which should stand outside the crescent representing the labellum, a little nearer the triangle.

The little circles show the position of the spiral vessels (fibro-vascular bundles); s s, stigmas; sr, stigma modified into the rostellum, A₁, fertile anther of the outer whorl; A₂, A₃, anthers of the same whorl; a₁, a₂, rudimentary anthers of the inner whorl (fertile in Cypripedium) generally forming the clinandrium; a₃, third anther of the same whorl, when present, forming the front of the column.

This view of the theoretical type of an orchid flower was accepted by Dr. Lindley and adopted by Mr. Darwin after further investigation. Both Dr. Brown and Mr. Darwin relied chiefly on the course of the fibro-vascular bundles, spiral vessels as they were then sometimes called while in a rudimentary state. Mr. Darwin traced these upwards from the ovary through the parts of the flower; the result of his dissection is given in the diagram below. The fifteen little circles represent so many groups of fibro-vascular bundles (spiral vessels) in every case traced down to the six large ovary groups; they alternate in five whorls, and in order to guide the eye, the three central groups running to the three pistils are connected by a triangle. The explanation of



these fifteen groups given by Mr. Darwin is that an orchid flower consists of fifteen organs in a much modified and confluent condition; the three sepals and petals are simple organs, but the labellum and column are compound; the labellum is formed of one petal and two petaloid stamens of the outer whorl completely confluent (see *infra*). The column is formed of three pistils and generally of four stamens all completely confluent; of the three pistils, the two lower ones are coalescent and the upper one is modified into the rostellum; the six stamens are in two whorls of three each, of which one alone of the outer whorl indicated by A1 in the diagram is fertile; but in *Cypripedium* and *Apostasia* two stamens of the inner whorl a1 and a2 are fertile, while in *Neuwiedia* and the anomalous *Cypripedium caudatum Lindenii*

all three are fertile.* Although in no true orchid except those mentioned are the two anthers of the inner whorl fully developed, their rudiments are generally present and are often utilised; for they generally form the membranous sides of the clinandrium or cup on the summit of the column which includes and protects the pollen masses; these rudiments thus aid their fertile brother anther.† But more recent and exhaustive investigations of the anatomy of the column of orchids undertaken by M. Philippe Van Tieghem, the results of which are published in vol. XXI. of the *Mémoires* of the French Institute, prove conclusively that Mr. Darwin's view of the stamens concealed in the labellum must be modified. M. Van Tieghem has shown that the rudiments of the stamens marked A₂, A₃ are situated not in the labellum but in the column like those of the inner whorl. The circles A₂, A₃ in the diagram indicate only branches of the fibro-vascular bundle entering the labellum.

Such is the view of the ancestral type or general pattern of an orchid flower entertained by one of the most profound naturalists of our time, and as modified by M. Van Tieghem's researches, generally accepted by men of science. No single species now exists exhibiting this full pattern, nor can we be sure that any such pattern ever did exist; but this in no wise weakens the foundation on which the hypothesis rests, nor do the comparatively few exceptional cases in which the course of the fibro-vascular bundles are found to deviate from the general plan, as in the great genus *Habenaria*. The strength of the hypothesis of this ideal type rests on its competence to account for in the most conclusive manner the general structure of all the orchid flowers we see, notwithstanding the endless variety of forms into which they have been moulded. We conclude our notice of this most interesting subject in Mr. Darwin's own words.

"It is interesting to look at one of the magnificent exotic species, or indeed at one of our humblest forms, and observe how profoundly it has been modified as compared with all ordinary flowers—with its usually great labellum taking the place of one petal—with its singular pollen masses—with its column formed of seven (nine) cohering organs, of which three alone perform their proper functions, namely, one anther and two generally confluent stigmas—with the third stigma incapable of fertilisation and modified into the wonderful rostellum—with three (five) of the anthers no longer capable of producing pollen, but serving either to protect the pollen of the fertile anther, or to strengthen the column, or existing as mere rudiments, or entirely suppressed. What an amount of modification, change of function, cohesion and abortion do we here see!"

* The genus *Neuwiedia* is the nearest approach to the ancestral form at present known.

† *Fertilisation of Orchids*, p. 298.

"Can we, in truth, feel satisfied by saying that each orchid was created exactly as we now see it on a certain 'Ideal type'; that the Omnipotent Creator having fixed on one plan for the whole order did not please to depart from this plan; that He, therefore, made the same organ to perform diverse functions—often of trifling importance compared with their proper function—converted other organs into mere purposeless rudiments, and arranged all as if they had to stand separate and then made them cohere? Is it not a more simple and intelligible view that all orchids owe what they have in common to descent from some monocotyledonous plant, which, like so many other plants of the same division, possessed fifteen organs arranged alternately three within three in five whorls; and that the now wonderfully changed structure of the flower is due to a long course of slow modification, each modification having been preserved which was useful to each plant during the incessant changes to which the organic and inorganic world has been exposed?" *

TERATOLOGY OF ORCHIDS,

By DR. MAXWELL T. MASTERS.

No account of orchid structure would be complete if it did not include some mention of the deviations from the ordinary conformation of the flower. These are frequently met with in the wild state, but much more commonly under cultivation. Roughly speaking, they are all included as malformations or "monstrosities." Some, indeed, are so, but others are really illustrations of a simpler and more regular disposition of the parts of the flower than that which is generally met with.

The literature of the subject is voluminous and scattered,† so that a volume, and that a large one, might be written on the teratology of orchids. All that I shall attempt to do in the following notes is to give a general sketch of the subject, and to show what are the changes that are most commonly met with. Restless florists ever on the look out, as they should be, for new developments, may

* Idem, pp. 305—307.

† The general subject illustrated from many examples taken from the *ORCHIDACEAE* is dealt with in my *Vegetable Teratology*, published by the Ray Society in 1869, and especially in the German edition of that work, prepared by Dr. Dammer (Leipzig, Haessel, 1886). See also Masters on the Floral Conformation of the genus *Cypripedium*, in the Journal of the Linnean Society, vol. xxii. (1887), p. 402; Orchids, Single and Double, in the *Gardeners' Chronicle*, May 5th, 1885, p. 597. An extensive series of drawings of malformed orchids by Mr. Hansen is preserved in the Natural History Museum, South Kensington.

possibly glean some hints as to the most promising directions in which to prosecute their labours, and the students of orchid structure may be interested in observing that these protean aberrations are really consistent with law and order. Of course a knowledge of the normal conformation is the first essential to an understanding of the abnormal condition, but if the reader has paid attention to the numerous illustrations given in the foregoing pages with the accompanying description, and which should be supplemented by studying and comparing every orchid flower that comes in his way, he will experience no difficulty whatever in comprehending what follows.

As already pointed out, an orchid flower consists of fifteen parts, viz., three sepals and three petals alternating with them, but one petal is generally so very different in appearance from the other two as to be called by a separate name, the labellum or lip; the sepals and petals collectively constitute the perianth. In the centre of the flower surrounded by the perianth is the column which is typically a combination of six stamens and three styles, but in the adult state only some of these parts are visible. Of the six stamens, of which traces may be usually seen in the anatomy of the flower and especially in the development and distribution of the vessels, five are arrested in their development, come to nothing or are represented by mere rudiments. One only reaches maturity in all the tribes except *Cypripedium*. In that genus four of the stamens are abortive and two are fully developed, and in the little known genus *Neuwiedia* three are abortive and three are developed.

The relative positions of these fifteen parts are indicated in the diagram in page 35. Bearing these in mind it is in general easy to group the deviations that are met with into certain principal categories; thus the parts of the flower taken collectively may be altered:—

I. In number, either by arrest of growth (defect), or by excess (increase). The defect or the excess may be in one series or whorl, or in more than one.

II. The change may show itself in the union, or in the disunion of parts. In the former case the union is generally congenital, and the term *concrecence* or inseparation is made use of to imply that the so-called union is really due to the lack of separation rather than to the union of previously isolated parts. The union or the disunion may of course take place between members of the same or of different floral whorls.

III. Another very frequent change is due to irregular or disproportionate growth; of this, in a normal orchid flower, the labellum is a notable example.

IV. Substitution or replacement of one part by another, commonly called metamorphosis.

V. Displacements. In considering deviations of this kind the change in the position of the flower that occurs in the course of development

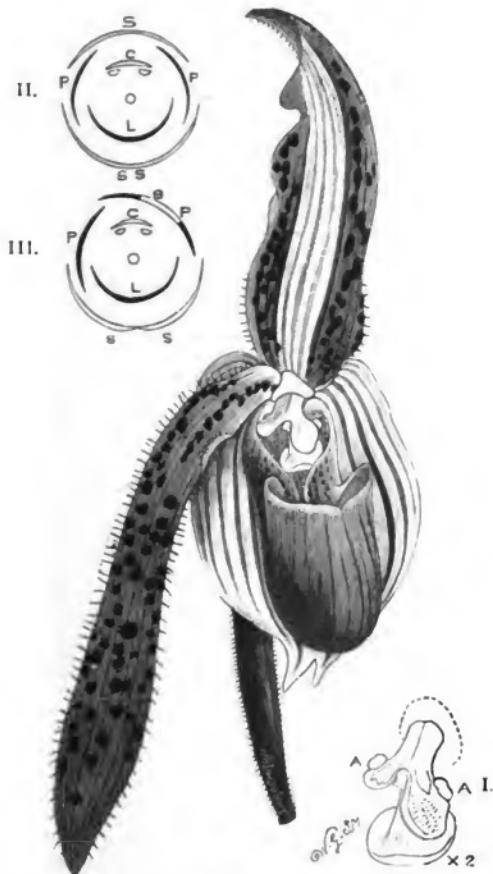


Fig. I. Malformed flower of *Cypripedium X Morganianum*, nat. size.

Fig. I., the column, twice nat. size; AA, the anthers. Fig. II., diagram showing the relative position of the parts of the flower in their natural condition. Fig. III., diagram of the malformed flower. s, sepals; P, petals; L, lip; C, column; O, ovary.

(From the *Gardeners Chronicle*.)

must not be overlooked. In the first instance, the flower is so placed that the lip is uppermost and the single perfect stamen at the lower

part of the flower; but in course of growth the ovary becomes twisted, so that in the adult condition we generally find the lip occupying the lower part of the flower. In some cases, *Disa*, *Satyrium*, etc., the twist does not take place, and the lip remains at the upper part.*

Displacement of one or more of the several members of the flower is very common; thus we find sepals taking the place of petals, and petals of sepals, and it is noteworthy that when an organ is so changed in position it is frequently changed in form and appearance also. A petal occupying the position of a sepal for instance will become like the sepal in form and colour, and is only to be distinguished by following the course of its development and the arrangement of its vascular bundles. A passage from the ordinary whorled to a spiral disposition of the floral parts is also not uncommon.

The woodcut, Fig. 1, illustrates displacement of parts in a flower of *Cypripedium × Morganii*, in which the connate lateral sepals, one petal, the lip and the column were normal. The peculiarity occurred in the upper segment of the flower, which took the position of the upper sepal, but which in appearance was partly sepal, partly petal. It was not possible to trace its erratic course during development, but it may be assumed that the upper sepal was not developed and that the upper segment was a lateral petal displaced, assuming in part the guise of a sepal as well as its position.

Other changes might be mentioned, but these are sufficient for the present purpose. It must, however, be carefully borne in mind that these changes rarely, if ever, occur separately but almost always in combination with others, and that an alteration in one part of a flower entails a corresponding change often of an opposite character as if by way of compensation.

After these general indications, applicable to the flower as a whole, I may now briefly advert to some of the principal or most frequent deviations met with in the several parts or whorls of the flower considered separately.

Outer row of perianth segments—Calyx. The changes that occur in the calyx (sepals) are usually of no great moment. Alterations of relative size are not infrequent, and a not uncommon change in some species of *Oncidium* is the reduction of the sepal to a mere thread, owing to the development of the midrib and to the concurrent arrest or suppression of the lateral portions of the segment. (This occurs normally in *On. abortivum* and *On. heteranthum*.) Theoretically the three outer segments should be distinct and separate, but we sometimes

* Mr. Douglas, of Ilford, Essex, not long since sent to the writer a very curious two-flowered inflorescence of *Cypripedium caudatum*, in which one flower had the lip uppermost, while in the other it occupied its normal position; the position of the other segments being correspondingly altered.

find them more or less united in *Masdevallia*, *Cypripedium*, *Cryptophoranthus*, many *Oncids*, etc. On the other hand it is not uncommon, especially in *Cypripedium*, to find the sepals separate.



Fig. 2. Malformed flower of *Cattleya guttata*, with diagram. s, sepals; p, petals; c, column, straight with a terminal anther.

(From the *Gardeners' Chronicle*.)

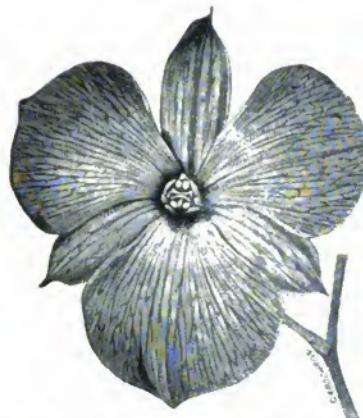


Fig. 3. Regular peloria of *Dendrobium Phalaenopsis*. The lip is scarcely different from the lateral petals either in colour or form.

(From the *Gardeners' Chronicle*.)

Inner row of perianth segments—Corolla, Petals. In this part of the flower we meet with changes of a very interesting character. The

lateral segments are subject to the same changes as to union and disunion (dialysis) and reduction as the sepals.

One very common change affecting the perianth as a whole may here be mentioned, and that is, a reduction in the number of parts in each whorl, so that instead of there being three sepals in one whorl alternating with three petals in the next, there are but two sepals,



Fig. 4. Regular peloria in *Laelia pumila*. In the left hand flower the lip scarcely differs from the lateral petals.
(From the *Gardeners' Chronicle*)

and these are crossed at right angles by a pair of petals. An illustration of this in *Cattleya guttata* is shown in Fig. 2. (This change is almost normal in the two lowermost flowers of *Grammatophyllum Fenzlianum* var. *Measuresianum*.)

The lip with its gorgeous colouring and singular form attracts the attention of the cultivator, whilst its position, its structure, its infinite

variations furnish the botanist, whether he be physiologist or morphologist, or both, with endless opportunities for study and unlimited sources of wonder and admiration. So far as appearance goes the lip is in general the main feature of the flower, being usually different from the other five segments, causing the flower to be irregular or "zygomorphic" in its construction; but in some few instances the lip is scarcely, if at all, different from the other segments* and the flower is then regular or "actinomorphic."

We may take such flowers to represent an approach to the primitive, unmodified type of orchid structure. In the cases mentioned the regularity of the lip is the normal or usual state of things, but where it occurs, as it often does, in flowers that are habitually irregular, then we have the condition known as regular peloria.* In *Dendrobium*, *Phalaenopsis*, *Laelia* and *Cattleyas*, for instance, the prominently large lip is occasionally replaced by one of approximately the same dimensions and form as in the other perianth segments, while in other instances the spur or the prominent ridges and teeth of the lip are altogether deficient (see Figs. 3 and 4). Such changes are of interest in some instances as bridging over the interval between two supposed genera; thus a flower of *Cypripedium caudatum* with a flat lip and other changes afforded evidence that *Uropodium* can hardly be separated as a genus from *Selenipedium* (see Fig. 7).† In such flowers the tendency is towards a greater simplicity of structure, or in other words, specialisation has not been carried so far as usual. Hence cases of regular peloria are considered as instances of reversion to a primordial or ancestral state. Not infrequently the lip is altogether wanting.‡

The opposite condition to regular peloria occurs when the characters proper to the lip are manifested also in the other two petals. Here the irregularity is intensified instead of diminished; the case thus becomes one of "irregular" peloria. A familiar illustration occurs in the variety of *Dendrobium nobile* known as *Cooksonianum* (see Fig. 5), and cases of "trilabellia" as Reichenbach called them are not uncommon in *Laelia purpurata*, *Calanthe vestita*, *Odontoglossum odoratum* var.

* Besides those mentioned in the text other instances are afforded by *Dendrobium normale*, the genera *Thelymitra*, *Thelasis*, *Neuwiedia*. An orchid with perfectly regular flowers is figured by Lindley in the *Botanical Register* of 1838, t. 60, under the name of *Paxtonia rosea*, but Reichenbach and following him Bentham refer it to *Spathoglottis plicata* as a peloriate form of that species. One thing is certain, it has never been seen in a living state since it was first sent from Manila by Cuming to Messrs. Loddiges in 1837.—M. T. M.

† Another evidence, and a strong one too, of the same tendency was obtained by fertilising *Cypripedium longifolium*, Rchb., with the pollen of *Uropodium Lindenii*, Lindl. (*C. caudatum Lindenii*, Veitch); the resulting progeny proved to be structurally identical with *Cypripedium grande*, previously obtained from *C. longifolium*, fertilised with the pollen of *C. caudatum*. The only discernible difference between the two is that the pouch of the labellum of the first-named hybrid is longer than that of *C. grande*.—A. H. K.

‡ Almost normally so in the lowermost, often the two lowermost flowers in the raceme of *Grammatophyllum Fenzlianum* var. *Measuresianum*.—A. H. K.

gloriosum, and even Cypripediums sometimes manifest this change, especially the hybrid *C. Sedenii*. (See also the figure of *Cattleya guttata* at p. 41).

A strange effect is produced in Cypripedium by the appearance of three pouch-like petals instead of one. These productions are usually marvelled at when seen, and frequently handed over to the botanist for post-mortem examination,* but few or no attempts are made to perpetuate them. It would doubtless be a long and tedious business to do so, but so is often the production of hybrids or seedlings. The fixation of a regular peloria of *Laelia purpurata* would result in the production of a flower

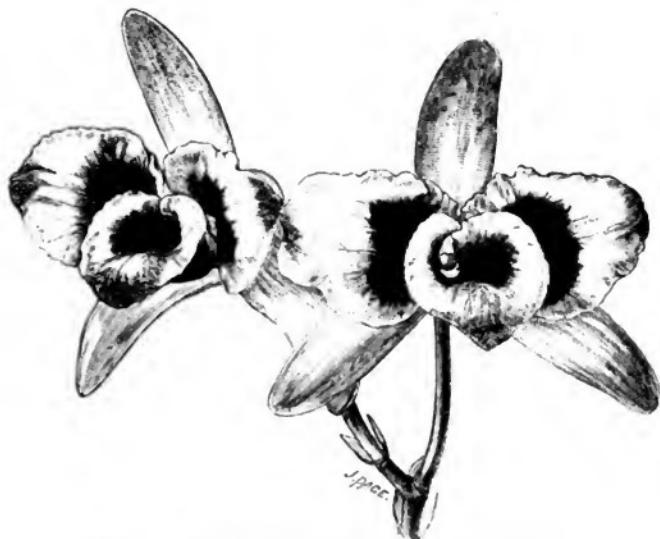


Fig. 5. Irregular peloria in *Dendrobium nobile* var. *Coekanitrum*.

not unlike Kämpfer's Iris, not with a single bloom but a panicle of them!—not with a comparatively evanescent flower, but with a cluster lasting weeks in beauty! Surely it is worth while to make the attempt to secure such a form.

Andracium—Column, Stamens, Style. It has been previously pointed out that the column consists of a welding together into one mass of six (potential) stamens and three styles (see page 36), and that of the six stamens only one is usually visible, or two in Cypripedium. The proof of this assertion, which to the ordinary looker-on seems

* Many pages of the MANUAL would be required to chronicle my own obligations to orchid growers in this matter for the last quarter of a century.—M. T. M.

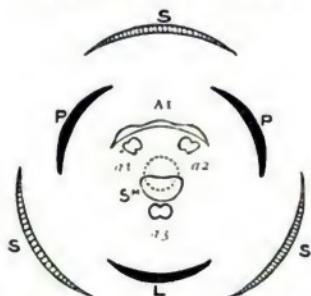


Fig. 6. *Cypripedium caudatum* intermediate form, diagram of flower.



Fig. 7. Flower of *Cypripedium caudatum* intermediate between the normal form and *C. caudatum Lindeni* (*Uropedium Lindeni*), with part of the lateral petals removed. The lip was curiously contorted and a third stamen was present, the position of which is indicated in the diagram at α3.

(From the *Gardeners' Chronicle*.)

audaciously unsupported, is derived mainly from facts and phenomena hardly capable of appreciation except by expert microscopists. Teratology, however, affords much more conspicuous evidence in the same direction, and when cautiously utilised in combination with other evidence yields a body of testimony to whose validity no exception can as a whole be taken. The presence of six stamens in an orchid flower may seem incredible to the ordinary observer, who sees therein only one; the others being potential, rudimentary, undeveloped, concealed. But the monstrous flowers in which the botanist delights often show plainly two or three, and not infrequently all six of the stamens, the potential being then replaced by the actual. Is it not a perversion of language to call a flower in which such a revelation occurs a "monstrosity"? It would occupy too much space to enter into details, but in my *Vegetable Teratology*, pp. 383—388, a whole series of such cases is given showing the occasional presence of two, three up to six stamens and three styles, and a similar case of where all six stamens were present in a form of *Cypripedium Selenii* is figured by me in the *Gardeners' Chronicle*. *

It should be added that these stamens are rarely perfect, generally they are more or less petaloid and imperfect; nevertheless, I once saw a flower of *Odontoglossum crispum* with all six stamens perfect, and I experienced a satisfaction in its inspection as keen as that felt by the decipherer of a cuneiform inscription!

Before leaving the consideration of the column, it is well to point out that it is sometimes found detached from the lip in those genera where normally it is adherent to it, and that it undergoes changes in form and curvature in association with alterations in the perianth; thus in the peloric forms it is usually straight with the anther at the summit as shown in Fig. 2. The significance of these changes in connection with fertilisation can here only be mentioned.

Double-flowered Orchids.—Under the general term "double" as used loosely by florists, several distinct conditions are implied. Flowers, and those of orchids included, may become double by the mere increase in number of their perianth segments without other material change. I have seen this in our common wild orchids as well as in *Odontoglossum crispum* and others under cultivation.

A more common form of doubling, so far as orchids are concerned, arises from the appearance of two or more of the cryptic stamens above referred to in the guise of petals, just as happens in the case of an ordinary double rose. Florists have not as yet sought to perpetuate and develop these double forms, but as previously stated there appears to be no insuperable obstacle to overcome if they were

* XXVI. (1886), p. 596. As this sheet is passing through the press I have received a *Cypripedium* from Sir Trevor Lawrence, Bart., with three stamens thus arranged $\begin{array}{c} \text{a} \\ \text{a} \\ \text{a} \end{array}$

disposed to do so. A plant of *Epidendrum vitellinum* is known to produce such flowers every year. In it the lip is regular, and the three outer as well as the three inner stamens are represented by petals (see Fig. 8).

Synanthry.—When two cells or two buds are in close proximity and more or less pressed upon by surrounding parts, it is not surprising that the cells or buds so situate should adhere one to the other. This indeed is the origin of some but not all of those Siamese twin-like flowers which are so common in plants generally, and which are by no means infrequent among orchids. The union takes place at a very early state of the flower's existence, when in fact they are in the embryonic condition. Their growth is rapid, disproportionate



Fig. 8. Regular peloriate and semi-double flower of *Epidendrum vitellinum*.
(From the *Gardeners' Chronicle*.)

to that of the surrounding tissue, hence the union and the compression. Under such circumstances it is to be expected that there will be more or less obliteration of some of the parts of the compressed flowers. The parts placed in the middle, subject on the one side to the growth-force of the developing buds, and on the other to the resistance offered by comparatively unyielding parts, are likely to be squeezed out of existence, and so indeed they are, and a "synanthric" flower made up of two or three in combination, rarely if ever contains the full quota of parts. Again, it is reasonable to expect in such a case that the parts or some of them will be displaced and thrown out of position, and so they often are. It is not always easy to determine at first sight how many flowers are concerned in the composite and which parts are present and which suppressed, but the botanist by

microscopic inspection of the vessels of the flower can generally succeed in unravelling the mystery.

Prolifications.—One other class of malformations remains to be spoken of, though it is by no means common in orchids. The central axis of an orchid flower (indeed of any other flower), that part from which all the other parts spring, is in reality the direct continuation of the stem or of a branch. Usually it is not prolonged beyond the flower, neither does it branch within the confines of the perianth; but, by exception, both these things happen, and when this is the case botanists speak of the occurrence as one of proliferation. It may be central, it may be lateral. The prolonged branch may give origin to scales or to leaves only, or it may produce flowers of greater or less degree of perfection. Rose growers know how common such deviations are in certain seasons. Orchid growers, if I may judge from the rarity of specimens that have come under my observation, scarcely ever see them in the flowers they cultivate. The instances I have seen, and they are but few, have been mostly among our wild orchises; but for one remarkable case in *Cattleya intermedia*, figured in the *Gardeners' Chronicle*, I am indebted to M. Lucien Linden.*

Causes.—The exciting causes that bring about the malformations above referred to are mostly unknown, but two things are suggestive of their origin—One is, that hybrids, and especially first crosses, are very liable to produce malformed flowers. While *Cypripedium × Sedenii* was still reckoned as a new plant, and derivatives from it were few in number, then, if I may judge from my own experience which has been very considerable, malformations in this hybrid were very common. Of late years I have not met with so many in this particular section; the plant and its offspring have become more fixed in their habit.† Again, newly imported orchids are very apt to produce misshapen flowers. Soon after the introduction of *Cypripedium Lawrenceanum* from Borneo, a wealth of malformed flowers poured in upon me owing to the kindness of friends and correspondents; now I rarely see a malformed flower of that particular species, and conclude that after the disturbance caused by its removal from its old habitat and its growth under different conditions, it has at length been enabled to adapt itself to the new circumstances and to settle down comfortably in its new home.

I speak of these two illustrations as specially suggestive, owing to the large numbers of malformed specimens of each that have passed through my hands, but I do not wish to lay disproportionate stress upon them because there are very numerous other hybrids and very numerous new

* Vol. II. s. 3 (1887), pp. 12—13.

† I do not think that this is so, but that on the contrary the malformed flowers occur so frequently that we cease to notice them. They can be found on almost every flower spike of *C. Sedenii* towards the end of the season.—H. J. V.

importations which, so far as I know, have not been affected in this way by their changed conditions.—*Celum non animum mutaverunt.*

The botanist who has these flowers put upon his study table is rarely able to do more than offer more or less plausible suggestions as to the causes that have produced them such as his knowledge of the ways of life of plants in general may afford. But the cultivator is in a very different position; he knows the circumstances under which the plants have been grown, he has watched them, it may be from infancy to maturity, he has regulated and controlled their natural dispositions, given or withheld as it seemed best to him, heat, air, light, water, pushed them on or rested them to suit his convenience. It is to him, therefore, as to a practical physiologist, that we must look for the determination of the why and the wherefore of these formations. It is to the botanist that we must look for the interpretation of their structure and for the indication of their significance as regards the construction, the purpose, the descent, and the filiation of the great order to which they belong.

VEGETATIVE STRUCTURE.

Although a considerable diversity of habit exists among epiphytal orchids, much of which has resulted from external circumstances as climate, locality, environment *in situ*, and even from the nature of the substratum, trees, rocks, etc., on which they grow in a wild state, the vegetative organs, the stems, leaves and inflorescence, whether considered conjointly or separately are reducible to a comparatively few types, some of which are repeated in many genera while others are more restricted. As a detailed description of their vegetative organs is given under all the most horticulturally important genera, only some of the most obvious generalisations with especial reference to the Tribes EPIDENDREÆ, VANDEÆ and CYPRIPEDIEÆ are here noticed.

The vegetative organs of orchids in their morphological aspect have been studied by Professor Pfitzer, of Heidelberg, who has published the result of his observations in an elaborate work entitled *Grundzüge einer vergleichenden Morphologie der Orchideen* (Outlines of a comparative Morphology of Orchids). In this work the author attempts to construct a comparative classification of orchids from the characters afforded by their vegetative organs. A large number of species included in many genera have been minutely examined and compared, and their morphological characters accurately noted and described; but as a far larger

number of species yet remain to be so minutely studied, we quite concur with Mr. Hemsley that Professor Pfitzer's classification is necessarily incomplete, seeing how many tropical species of orchids are only known from imperfect specimens preserved in herbaria.* Nor is it quite clear what practical end would accrue to systematic botany from a classification founded on a more complete examination even if it were attempted, since the characters afforded by the vegetative organs can have but a subordinate value in the systematic arrangement of the ORCHIDÆ or any other family of phanerogamic plants. The highest division in which these characters have been made available by Mr. Bentham in his revision of the ORCHIDÆ for the *Genera Plantarum* are his sub-tribes,† their systematic value being in an inverse ratio to the rank of the group or division in which they are used, and thence greatest as distinguishing marks in the species and their varieties.

Nevertheless, the primary divisions of Professor Pfitzer's classification of the ORCHIDÆ as founded on the vegetative organs are very natural ones and the best of their kind that have been proposed, and moreover not devoid of practical value to the cultivator. On these grounds alone they are worthy of attention, and we thence bring them before the reader with examples selected from each division restricted chiefly to epiphytic species and the CYPRIPEDIEÆ.

These primary divisions are—

I.—MONOPODIAL ORCHIDS. Those which grow continuously in one direction only. Their stems lengthen indefinitely season after season, and bear aerial (adventitious) roots often along their whole length. The inflorescence is always lateral and is produced from the axils of the leaves or opposite to them.

II.—SYMPODIAL ORCHIDS. Those in which the growth of the main axis, stem or pseudo-bulb soon ceases, usually at the end of one season's growth, and a lateral growth is produced in the following season.

The Sympodial Orchids admit of a division into two groups—

A.—Those bearing a lateral inflorescence.

B.—Those bearing a terminal inflorescence.

The monopodial orchids form a comparatively small division; they include Bentham's sub-tribe SARCANTHEÆ, and some species in other sub-tribes not often seen in cultivation in other than botanic gardens except Vanilla. Well-known examples of monopodial orchids are afforded by Vanda, Aërides, Angraecum, Arachnanthe, Rhynchostylis, Saccolabium,

* Gard. Chron. XVII. (1882), p. 341.

† See the sub-tribal characters of Pleurothallææ, Bletiææ, Eulophiææ, Sarcantheææ, etc.

Phalaenopsis and allied genera. In all these genera the leaves are distichously arranged, that is to say, they are in two rows one opposite the other, the leaves of one row alternating with those of the other.



Rhynchostylis retusa.
A monopodial orchid with lateral racemose inflorescence.

In some species the internodes are very short and the leaves much crowded; they are nearly always much longer than broad, embracing the stem at their base, notched or unequally lobed at their apex; usually flat (dorsiventral or bi-facial) with a sunk median line on

the upper face and a corresponding keel, more or less defined on the under one, but sometimes the leaves are conduplicate, folded from the base to the apex. In a few species the leaves are of the "centric" type, much resembling the stem from which they spring, being terete, dull in colour and usually sharp pointed as in *Vanda teres*, *Aërides Vandarum*, *Angræcum Scottianum*, the genus *Luisia*, throughout many species of *Sarcanthus*, etc. The leaves of monopodial orchids are nearly always leathery in texture and persistent several years under cultivation; deciduous species occur in *Phalaenopsis* (*P. Lowii*), *Sarcochilus* (*S. luniferus*) and one or two others.

The inflorescence is racemose, or less frequently some modification of the raceme, chiefly the panicle. In *Rhynchostylis* and in many species of *Aërides*, *Saccolabium*, *Sarcochilus* the raceme is very dense and many-flowered. In *Arachnanthe*, *Vanda*, *Stauropsis*, etc., it is often short, lax and few-flowered. In *Arachnanthe Lowii* the floral axes extend several feet in length and bear in the aggregate several hundreds of flowers; in some species of *Angræcum* (e.g., *A. pertusum*, *A. citratum*) the flowers are secund, all facing one way, and their perianth segments being nearly in the same plane, the inflorescence has a strikingly formal appearance. The finest instances of the paniculate inflorescence are sometimes seen in *Phalaenopsis Schilleriana*, *P. Stuartiana*, *Aërides crispum*, and *A. multiflorum*.

The sympodial orchids constitute by far the largest division; all the terrestrial kinds both tropical and temperate, all the pseudo-bulbous species, and all whose stems are matured in one season are included in it. In these orchids new growth generally begins with the development of leaf-like scales which gradually pass into true leaves, so that it sometimes happens that between the first pair of leaf scales and the true leaves many intermediate forms occur. In pseudo-bulbous species with few leaves, the pseudo-bulbs are often formed between the first pair of true leaves, and one or two more leaves are produced from the apex of the pseudo-bulb, as in *Odontoglossum*, *Oncidium*, *Miltonia*, etc. In other species the vegetative axes are often prolonged into leafy stems of varying length and thickness. In both cases the old pseudo-bulbs and the old stems persist for some time after they have become effete, the terminal ones alone being floriferous.*

The group of sympodial orchids with lateral inflorescence is a very

* The stems of some of the evergreen *Dendrobium* in the sub-section CALOSTACHYÆ (*Dendrobium Farmeri*, *D. densiflorum*, etc.) are an exception; these produce their handsome thyrsoid racemes three or four years in succession.

extensive one, and comprises many of the finest epiphytal kinds in cultivation. Among the included genera are Dendrobium, Calanthe, the whole of the sub-tribes **OXCIDIÆ** (*Odontoglossum*, *Miltonia*, *Trichopilia*, etc.), **STANHOPIÆ** (*Coryanthes*, *Peristeria*, *Houleitia*), **CYRTOPODIÆ** (*Zygopetalum*, *Lycaste*, *Anguloa*); also a series of genera both in the **EPIDENDRÆ** and **VANDÆ** with fleshy or pseudo-bulbous stems composed of several internodes but producing a tuft of leaves

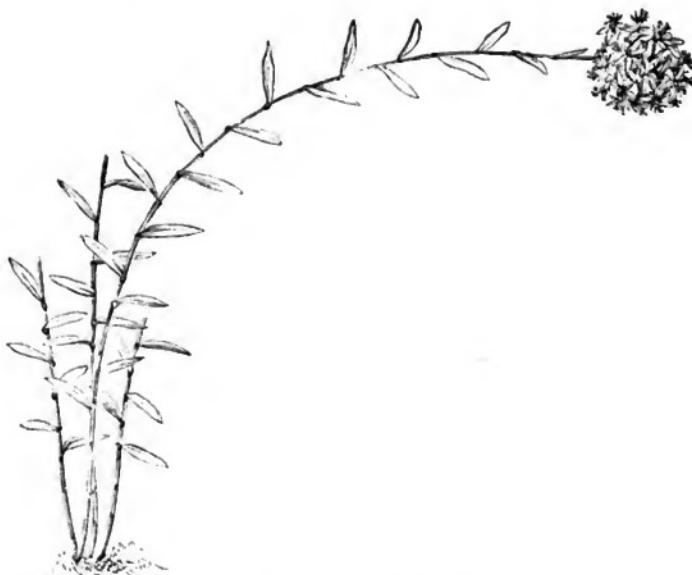


Bulbophyllum barbigerum.
A sympodial orchid with lateral inflorescence.

at the upper end only, but below only scales; after the fall of the latter the stem appears ringed (*Phaius*, *Chysis*, *Cyrtopodium*, *Mormodes*, *Cycnoches*, etc.). *Cymbidium* and *Cyperorchis* are also placed in this group, but it is well known to cultivators that the stems of all the cultivated species continue to grow for more than one season, but eventually cease when the new growths have reached the flowering stage.

The group with terminal inflorescence is a still more extensive one, for it includes all the terrestrial kinds, of which there are several large genera spread over an immense geographical area, as *Habenaria* and *Cypripedium* (including *Selenipedium*). Among the epiphytal orchids included in this group, *Cattleya*, *Lælia*, *Schomburgkia*, *Sophronitis*, *Diacrium*, *Epidendrum*, *Cœlogynæ*, are the most important from a horticultural standpoint, and of subterrestrial genera, *Masdevallia*, *Restrepia*, *Cryptophranthus*, *Sobralia*, *Thunia*, etc.

Rhizome.—All the epiphytal species in both groups of sympodial orchids are provided with a rhizome from which are produced the



Epidendrum xanthinum. Sympodial orchid with terminal inflorescence.

stems, the pseudo-bulbs and the roots. The extent of the development of the rhizome greatly influences the habit of the plant; in a large number of genera, *Odontoglossum*, *Dendrobium*, *Masdevallia*, etc., the rhizome is for the most part very short, and the plants consequently have a tufted habit; in *Cattleya*, *Lælia*, the *Aulizeum* *Epidendra*, and some others, it is very strong and of ligneous texture, varying in thickness from that of a goose-quill to that of a man's little finger; in many *Bulbophyllums*, *Cirrhopteridiums*, some of the *Rodriguezias*, *Cœlogynæ*, and others, the rhizome is greatly elongated and the

pseudo-bulbs are placed at a considerable distance from each other, whence these plants have a straggling habit; when thus prolonged, it is usually clothed with brown scarious scales; in the caulescent Maxillarias (*M. tenuifolia*, etc.) and in species included in many other genera (*Odontoglossum cordatum*, *Oncidium flexuosum*, etc.) it is scandent; and many intermediate forms exist. In *Bulbophyllum Beccari* the rhizome is enormously developed, encircling the trees to which it is attached like the coils of a serpent; in *Oncidium zebrinum* it is scandent and often excessively elongated, the intervals between the pseudo-bulbs being sometimes as much as from 6 to 8 inches; but these are extreme cases among the cultivated ORCHIDÆ.

Roots.—The normal roots of orchids are cylindric, often thread-like, branching, and of great length; in most Cypripedes they are furnished with numerous root hairs. The aerial roots of epiphytal orchids consist of a central axis, surrounded with a covering of loose light tissue, technically called the *velamen*, the cells of which when dry are filled with air only; this spongy covering, with its thin epidermis, absorbs moisture with great rapidity; both the primary roots and their branches terminate in a greenish or greenish brown sheath, the *calyptra*, which protects an organ of very great importance and delicacy, the "punctum vegetationis" or growing point, and the formative tissue which surrounds it. Generally, the roots of epiphytal orchids are pendent, but in some species of *Cymbidium* under cultivation, the secondary roots grow upwards; and in *Grammatophyllum* the secondary roots with their rootlets form a dense plexus of considerable thickness, which dies off at the end of the growing season. The white thread-like much-branched roots of several of the Rodriguezias, of *Oncidium sphacelatum* and others grow into a dense tangle which forms a distinct feature of these plants.

It may here be noticed that the roots of most species of the monopodial genus *Phalaenopsis* become much flattened as they creep over surfaces in their immediate neighbourhood, and to which they cling with great tenacity. And in those Aërides, Vandas, etc., whose leaves are of the "centric" type (*A. cylindricum*, *Vanda teres*, etc.) the roots assist the plants to climb to the tops of high trees in quest of more air and light than they can obtain in the dense jungle of an Indian forest.*

Leaves.—Among the sympodial orchids occurs well-nigh every form of leaf known in the ORCHIDÆ. As the leaves of all the genera and their included species treated on in this work are described in their respective places, a few of the most obvious characteristics need

* Two of our native orchids, *Epipogon aphyllus* and *Corallorrhiza innata*, both unfortunately fast becoming extinct in this country, have neither roots nor leaves, but are saprophytes, living on the organic matter in the soil under trees. Another British species, the "Bird's Nest Orchis," *Neottia Nidus-avis*, plentiful in some localities, is also a saprophyte; it is a plant with brown stems clothed with scales.

only here be noticed. The distichous arrangement is universal throughout the epiphytal species and *Cypripedium*, although sometimes more or less disguised, especially when the leaves are few in number. The leaves are usually much longer than broad; in those species in which the vegetative axes are more or less lengthened they are sessile or embrace the stem at their base and pointed at the apex (the fasciculate *Dendrobes*, *Epidendra*, *Thunia*, etc.). When the axis is thickened or reduced to the pseudo-bulbous form, the leaves are fewer in number and usually of much larger size. Those leaves that are persistent for several years are of very leathery texture, sessile or very



Loosely racemed inflorescence of *Oncidium longipes*.

shortly petiolate and usually obtuse at the apex (*Cattleya*, *Laelia*, many of the Calostachyate *Dendrobes*, the stemless *Oncids*, etc.); those that are deciduous or fall off at the end of a season's growth are of herbaceous texture, distinctly petiolate, the petiole being winged or folded, are more or less plaited, and have prominent veins that are either parallel or symmetrically curved on both sides of the midrib. In *Peristeria*, *Coryanthes*, *Anguloa*, many *Lycastes*, *Houlelia*, etc., the plicate leaves are conspicuously large. Leaves of the "centric" type, which are sometimes fleshy and sometimes greatly elongated, occur in *Brassavola*, *Scuticaria*, *Tetramicta* (*Leptotes*), the Strongyle *Dendrobes* (as *D. teretifolium*), also in *Oncidium Jonesianum*, *On. Cebolleta*, etc.

Inflorescence.—Every form of inflorescence that occurs in the ORCHIDÆ is also found among the sympodial species. The flowers are solitary throughout *Lycaste*, *Maxillaria*, *Anguloa*, in many *Masdevallias*, *Restrepia*, the section *Hunleya*, *Bollea* and *Warscewiczella*, of *Zygotepetalum* and others, on terete smooth peduncles with two or more bracts; in many *Cypripedes* on terete hairy uni-bibracteate peduncles. They are in short few-flowered racemes in many genera and sections of genera; in long many-flowered racemes in *Cymbidium*, *Grammatophyllum*, many *Odontoglossa*; in dense spikes in *Arpophyllum*, *Coelia*, *Oberonia*; in trailing panicles several feet long in many species of *Oncidium*; and every conceivable intermediate form. In *Megaclinium* (a genus rarely represented in amateurs' collections) the floral axis is flattened into a broad plate; it is also flattened towards the upper end in *Oncidium Papilio*, and in *Phalaenopsis Cornu Cervi*. In *Oncidium heteranthum*, *On. abortivum* and probably others, flowers of different forms occur in the same inflorescence;* in *Catasetum* and *Cynoches* the flowers are mostly unisexual, the flowers of each sex differing in form and usually produced in different racemes. Many orchid flowers are scentless, but the great majority are more or less odoriferous, the fragrance exhaled by very many being of the most agreeable kind, while in others as *Masdevallia Gargantua*, *M. velifera*, many *Bulbophyls*, and especially *B. Beccarii*, the foetor is most repulsive.

MINUTE STRUCTURE.

In an article published in the *Gardeners' Chronicle* of May 9th, 1885, Dr. Masters called attention to the relation that subsists between the minute structure of the vegetative organs of plants, especially of the leaves, and their functions, as indicated by Stahl and others, and gave some illustrations selected from some well-known orchids in cultivation. These illustrations, which are transverse sections of the leaves magnified forty diameters, bear strong evidence of the minute structure being indicative of the conditions under which the plant grows. Admitting the partial and incomplete nature of the examination, it was sufficient to enable the observer to state the general conditions as to light and shade and supply of water the plants required, and these conclusions were found on consultation with practical cultivators to be near approximations of the truth in

* See p. 40. The two (rarely three or four) lowermost flowers in the racemes of *Arachnanthe Lowii* are different in form and colour from the others.

all cases. It is thence evident that could a sufficiently comprehensive knowledge of the minute structure of the vegetative organs of orchids be brought within the reach of orchid growers generally, its influence for good in the cultural treatment of the plants would be of an enduring kind. Dr. Masters remarks that:—

"In the leaves of orchids we have the component structures apparently arranged with reference to the conditions under which the plant grows naturally. Some grow in full sunshine, and are constructed accordingly. Some thrive in diffused light. Some bear a long period of drought uninjured; others could not endure the privation of water even for a few hours. Some are so constructed as to adapt themselves to varied conditions with little trouble, and these, of course, are the plants the gardener finds it easy to cultivate. In others the adjustment is so delicate that they cannot suffer any change without inconvenience; these are the plants the gardener has a difficulty in keeping alive, and which even in their native countries are dying out, elbowed out by their more robust and less exacting brethren on the principle of the survival of the fittest."

If then, the conditions noted in the foregoing quotation are made manifest in the leaves of orchids by their minute structure, and we have every reason to believe that this structure is a part of the result of their "environment" and that it enables them to perform their important functions to the best advantage of the plant, it must be worth while to ascertain what that structure is, in order to obtain reliable data for cultural treatment. Confessedly imperfect as were the investigations of Dr. Masters up to the date of publication (and so far as we know, very little has been done by others in the same direction since), their import and their intrinsic value to cultivators when they shall have been more elaborately worked out is, however, so evident that we have been induced to continue the examination with the view of adding something more to our knowledge of the subject, and with the hope of inducing others who may have leisure at their disposal to take it up more comprehensively.

The sections of leaves, stems and roots that are here illustrated were made for us by Mr. N. E. Brown, of the Kew Herbarium. For three other illustrations we are indebted to the kindness of the proprietors of the *Gardeners' Chronicle*, and all bear ample testimony to the accuracy and care with which they have been executed.

The technical description and terminology of the various tissues of plants must be sought for in text books devoted to the subject; * we can only here offer so much explanation as will render the illustrations intelligible to the general reader.

All complete vegetable structures consist of cells for the most part indistinguishable by the naked eye. Each living cell in what is conveniently regarded as its normal state at the epoch of commencement of growth consists of (1) a transparent colourless membrane called the cell-wall which encloses (2) the protoplasm, "the physical basis of life" as it has been aptly termed by Professor Huxley, which forms a layer closely lining the cell-wall, (3) a denser rounded mass of the protoplasm called the nucleus, which is either embedded in the layer of protoplasm lining the cell wall, or is suspended in the middle of the cell by fine threads of protoplasm, the intervening space (4), the vacuole, being filled with a colourless fluid, the cell-sap. Cells so constructed are more or less of spherical form and may be seen in the young shoots of all plants, in some of which they are found more favourable for observation than in others, as in the pith of a young growing shoot of the elder, the hairs on the stamens of *Tradescantia*, etc.; but in most cases a high magnifying power is necessary for the several parts above described to be clearly made out, though in the footstalk of a rhubarb leaf they are so large as to be readily seen by the naked eye. Such it is usual to regard as the fundamental form of vegetable structure, from which all subsequent developments originate. In all the most highly organised plants, although the cells have an independent existence for a time, there are always a large number of them in close contact and firmly united, forming a cellular tissue, a number which increases as growth progresses till in the full-grown plant, even when of only moderate dimensions, the number of cells in the aggregate exceeds the power of ordinary calculation. Nevertheless, even in the higher plants isolated cells occur during temporary states of existence as pollen grains, fern spores, the antherozoids of mosses, etc. The actual forms and sizes of the cells are as varied as the structures of which they form the constituent parts; they are subject to regular changes like the whole plant which they build up. Only those cells are in a living state which contain protoplasm; they alone can grow and give rise to new cells; cells devoid of protoplasm may, however, be of service to the plant as supports and protection to the growing parts, or as conduits and store places.

Every new growth begins with a change in the protoplasm by virtue

* Among the best are Sachs' *Lehrbuch der Botanik*, English translation by Dr. Sydney H. Vines; the latter author's recently published *Student's Text Book of Botany*; and De Bary's *Comparative Anatomy of the Vegetative Organs of Phanerogams and Ferns*, translated by F. O. Bower and Dr. H. Scott.

of the vital force with which it is endowed, a power that can no more be accounted for or explained than the states of consciousness that enables us to distinguish a sound from an odour, a colour from a flavour, or any other ultimate fact of Nature. There is a continuous movement of the particles, and although extremely slow and inperceptible to our limited powers of vision, such a movement is inseparable from the idea of life. This movement results, in all the higher forms of vegetation, in a division of the mother cell into two others more or less like itself, and these again divide in like manner. As division and sub-division proceed, a differentiation also takes place in the cell contents; chlorophyll granules are formed in some, starch-grains, resin, crystals of various kinds, etc., occur in others; as well as a modification in form according as each fulfils its own definite part in the economy of the plant.

The numerous and densely crowded cells form the "fundamental tissue" from which in course of time, and in accordance with varying requirements, different layers of tissue develop differently, so that the adult plant consists of differentiated tissues. In general, the whole mass of tissue is definitely bounded on the outside by an *Epidermal layer* or outer skin consisting of one layer of cells. This surrounds and encloses a rind or "cortex" of several layers, whilst the centre is occupied by a mass of cells, some of which remain unchanged while others are gradually converted into long strands. These strings of tissue, the *fibro-vascular bundles*, usually follow in their longitudinal course the direction of the most vigorous growth which immediately precedes their differentiation. Not only the cortical layers, but also the vascular bundles and the fundamental tissues are more or less differentiated, the sub-epidermal into layers of a different nature; the bundles also exhibit differentiation, and generally in a still higher degree. In this manner arise in the higher plants *Systems of Tissues*.

In two or more years' old stems of the Dicotyledonous division of flowering plants, also of the Gymnospermous Orders (Conifers, Cycads, etc.), the component tissues are arranged in concentric rings as is shown in the wood of our common trees and shrubs which consists chiefly of fibro-vascular bundles so strongly developed by the continuous formation of tissues of which they are composed, that they finally almost replace the intermediate fundamental tissue; in the leaves, the fibro-vascular bundles (veins) are netted (reticulated) or otherwise more or less irregularly disposed. On the other hand, in the Monocotyledonous Division, that to which the ORCHIDÆ belong, the fibro-vascular bundles of more than one year's old stems as in Vanda, Cattleya, Dendrobium, etc., and also in the pseudo-bulbous species, are isolated and separated from each other by fundamental tissue; and in the leaves they are either parallel to each other or symmetrically placed on each side of the midrib.

In the fundamental tissue, if the cells are arranged more or less distinctly in rows, and bounded by flat or curved walls, and are not much longer than broad, the tissue is called *parenchyma* or parenchymatous tissue; of such is the soft tissue of the leaves, etc. But if the cells are pointed at their ends, much longer than broad and dovetailing into one another, it is called *prosenchymatous*; of such are the ligneous cells of the stems and rhizomes of all monopodial orchids, also of Cattleya, Laelia, Epidendrum, and many others. The differentiated tissues of the vascular bundles may be ranged under two groups called the bast and wood portion (technically the "phloëm" and "xylem"); they are separated by *cambium* when there is any. The bast consists generally of thin-walled cells and tubes for the conveyance of nutriment; the xylem or wood portion has generally thickened cell-walls which become hard and ligneous for the purpose of support. The cambium consists of cells capable of further development; it has the power of forming new cells, and of furnishing the material for the production of new permanent tissue either of bast or of wood in addition to that already in existence.

The general structure of the leaves of orchids may be thus sketched. There is a central spongy mass, the "mesophyll," consisting of cells not always arranged in the same way nor of the same size and form, but generally in easily recognisable layers. A few are empty or filled with air; some are filled with water; some contain food in the shape of starch grains; some are provided with green colouring matter, or *chlorophyll* as it is called, to which leaves owe their colour, and in no small degree their vitality; some are charged with red or purple-coloured fluid; some give shelter to crystals of various forms. This central mass is traversed longitudinally by the fibro-vascular bundles or veins, including sundry thinner and more delicate vessels of various modifications which play a part in the transmission of nutritive juices from one part to another. The whole is protected on each side by a skin or *epidermis* which, besides being a protective organ, allows of the passage in and out of the leaf of air and vapour by means of minute pores or apertures (the *stomata*) which are generally most numerous on the under surface and which open or close according to the dryness or moisture of the atmosphere.*

The illustrations of minute structures of the leaves, stems and roots of some well-known orchids here given should now be intelligible to the general reader, and some obvious relations between the structure and functions may be pointed out.

Leaves.—In every figure the same numerals indicate the same tissue or structure, viz., 1, the upper, 2 the lower epidermis; 3, the parenchyma or cellular tissue of the leaf, sometimes called the

* Gard. Chron. XXIII. (1885), p. 607.

mesophyll; 4, the fibro-vascular bundle of the midrib; 5, smaller bundles parallel with the midrib (veins); 6 (where present), still smaller bundles (veinlets). The epidermis is always covered by a structureless *cuticle* developed from the cell-walls and forming an unbroken layer over the whole leaf and resisting too rapid evaporation of the fluids within. Fig. 1 illustrates a transverse section of a leaf of

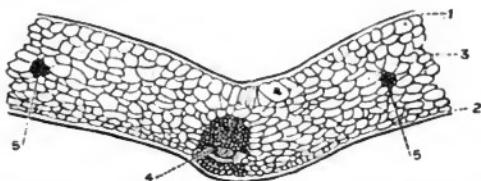


Fig. 1. Transverse section of leaf of *Dendrobium nobile* at midrib, enlarged 30 diameters.
1, upper, 2, lower epidermis; 3, parenchyma or soft tissue containing chlorophyll granules; 4, fibro-vascular bundle of the midrib; 5, two smaller bundles.

Dendrobium nobile enlarged 30 diameters. Immediately underlying the upper epidermis is a layer of almost circular colourless cells filled with air or water; a similar layer of smaller and more closely packed cells underlies the lower epidermis; the cellular tissue between them consists chiefly of egg-shaped cells filled with granules of green colouring matter, the chlorophyll, not shown in the figure; they are less closely packed than

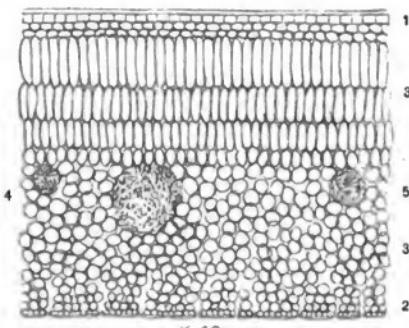


Fig. 2. Transverse section of fragment of leaf of *Dendrobium Jenkinsii*, X 40. The numerals as in Fig. 1.
3a, palisade cells.
(From the *Gardeners' Chronicle*.)

the others, and have interspaces here and there between them which communicate with the outer air by means of minute pores or stomata in the epidermis, also not shown in the figure. In the centre is the midrib, and on each side of it a smaller fibro-vascular bundle which contribute to the strengthening of the leaf, passage of fluids, etc. The

leaf of *Dendrobium nobile* is thin, and its means for the storage of water is limited, presumably therefore needing diffused rather than direct sunlight, as under the influence of the latter, evaporation would be too rapid.

Fig. 2 shows a similar section of a leaf of *Dendrobium Jenkinsii*. The leaves of this species are small and thick, with three layers of cells called from their peculiar appearance *palisade* cells (3a in figure), underlying the hypodermal water cells, and which are always full of deep-coloured chlorophyll granules, their numbers, size and intense coloration being always in direct relation to the amount of light. When these palisade cells are well developed it is a sure sign that in their

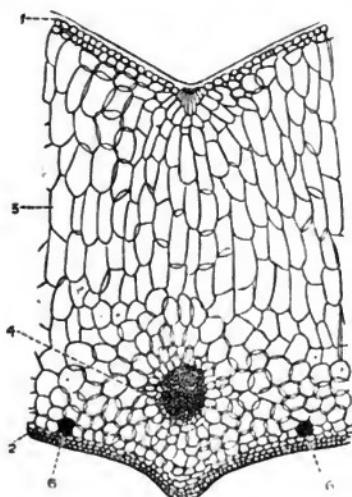


Fig. 3. Transverse section of leaf of *Cattleya internmedia* across the mid-rib, X 30 diameters.
1, upper, 2, lower epidermis; 3, fundamental tissue of soft thin-walled cells containing chlorophyll granules; 4, fibro-vascular bundle of midrib; 6, smaller bundles.

native country the plants are exposed to bright sunshine; whilst on the other hand their abundant supply of chlorophyll enables them to endure adverse conditions better than less richly endowed plants can do.

Fig. 3 shows a transverse section of a leaf of *Cattleya internmedia* at the midrib. The cells of the upper part of the fundamental tissue are much elongated, approaching the palisade form and are filled with chlorophyll granules. The general structure compared with that of the *labiate* Cattleyas is simpler, thus affording another distinctive mark between the two-leaved and usually long-stemmed and the one-leaved short-stemmed Cattleyas. It is a remarkable fact too, that similar

sections of a leaf and stem of another two-leaved Cattleya, *C. velutina*, proved to be nearly identical in structure with those of *C. intermedia*.

Fig. 4, *Cattleya Mossiae*. Here the minute structure is more elaborate,

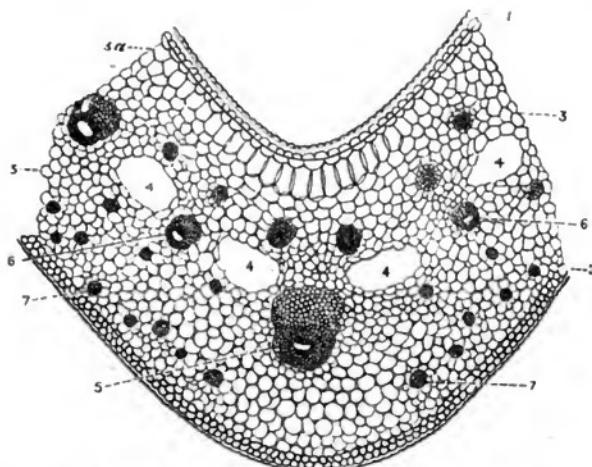


Fig. 4. Transverse section of leaf of *Cattleya Mossiae* at the midrib.

1, upper, 2, lower epidermis; 3, parenchyma or soft tissue of the leaf sometimes called the mesophyll, containing chlorophyll granules (not shown in figure); the layer immediately under the upper epidermis indicated by 8a and called the hypoderm, consists of colourless cells containing water; 4, air cavities; 5, fibro-vascular bundle of midrib shown diagrammatically, the upper club-shaped portion consists of thick woody cells which serve to protect the more delicate tissue beneath; 6, smaller bundles (veins), running parallel with the midrib; 7, still smaller bundles (veinlets).

presumably indicative of the more changeable climatic conditions under which the plant grows. The leaf is thick and fleshy, the epidermal cells small and closely packed; the hypoderm or water cells are large; the

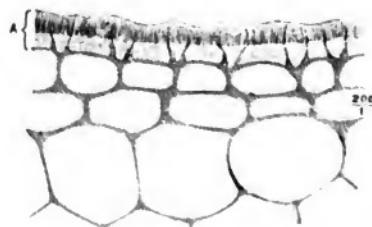


Fig. 5. Fragment of epidermis and underlying cells of *Cattleya Mossiae* magnified 200 diameters; the outer surface of the epidermal cells is developed into a thick cuticular layer (A) covering the whole surface and which has a peculiar striated structure in the external half. This thick cuticle impedes excessive evaporation

air cavities are also large and nearly equidistant from both surfaces; the fibro-vascular bundles are numerous and somewhat similarly grouped on each side of the principal or midrib-bundle. This structure may be

connected with the occurrence of a heavy rain-fall, which we know to be the case in its native home, and also exposure to direct sunlight. Fig. 5 is a fragment of the upper epidermis and underlying cells magnified 200 diameters to show the structure more clearly.

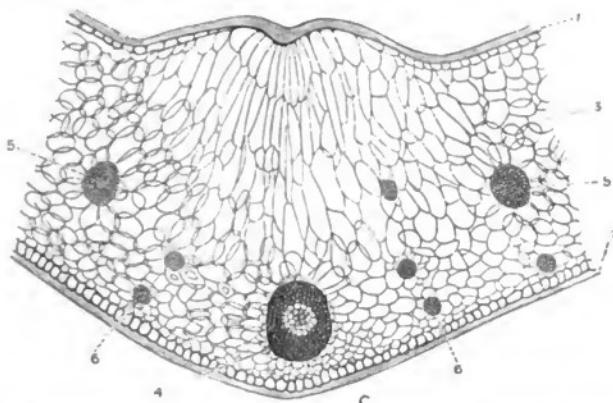


Fig. 6. Transverse section of leaf of *Lelia purpurata* across the midrib, enlarged 40 diameters.

1, upper, 2, lower epidermis, both with thickened cuticle; 3, parenchyma or soft tissue (mesophyll), containing chlorophyll granules (not shown in figure); 4, large vascular bundle of the midrib; 5, two smaller vascular bundles parallel with the midrib; 6, smaller vascular bundles (veinlets).

Fig. 6, *Lelia purpurata*. The thickened cuticle and elongated cells filled with chlorophyll imply a greater exposure to direct sun-light, and

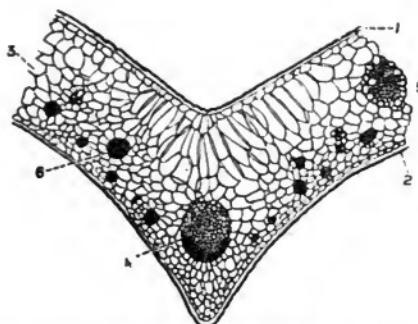


Fig. 7. Transverse section of leaf of *Odontoglossum crispum* at midrib, enlarged 50 diameters.
The numerals as before.

the smaller hypoderm or water cells a shorter duration of the rainy season than in the case of *Cattleya Mossiae*, the other circumstances remaining much the same.

Leaves of VANDEÆ.—Fig. 7, *Odontoglossum crispum*. Here the cuticular covering is thin, the capacity for resisting evaporation and the storage capabilities as regards water relatively small, and the fibro-vascular bundles numerous; circumstances that seem to point to the cultural

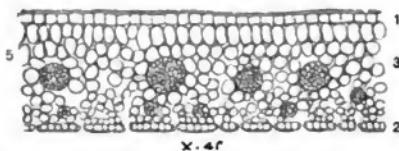


Fig. 8. Transverse section of leaf of *Bifrenaria Harrisoniae*, $\times 40$. The numerals as in Fig. 1.
(From the *Gardeners' Chronicle*.)

treatment experience has proved to be the best, viz., diffused light and abundance of moisture. Fig. 8, *Bifrenaria Harrisoniae*. The structure is essentially the same, and needs no detailed explanation further than to note the numerous small fibro-vascular bundles immediately above the lower epidermis; the leaf has thus a very stringy appearance when torn.

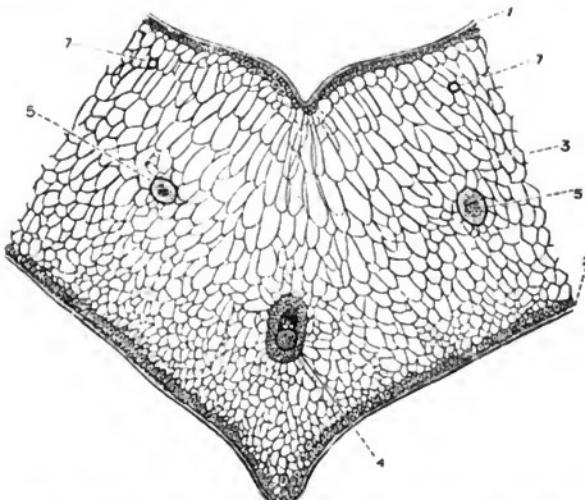


Fig. 9. Transverse section of leaf of *Vanda tricolor* at midrib, $\times 40$ diameters.
Nos. 1–5 as before; 7, bast-like fibres.

This structure indicates no necessity for direct solar exposure. *Lycaste Skinneri* has a similar but not an identical structure. Fig. 9, *Vanda tricolor*. Like most monopodial orchids, it comes from a locality where the temperature is always high and its fluctuations at a minimum, and

where the hygrometric conditions of the atmosphere are for the greater part of the year the most intense. Its leaf structure is thence adapted to these conditions; a thick cuticle and closely packed epidermal cells

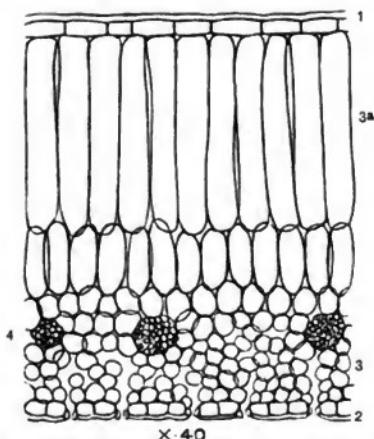


Fig. 10. Fragment of transverse section of leaf of *Cypripedium niveum*. 3a, elongated water cells; the other numerals as before.

(From the *Gardeners' Chronicle*.)

and numerous underlying elongated cells approaching the palisade form implying more or less exposure to a vertical sun, and also ample

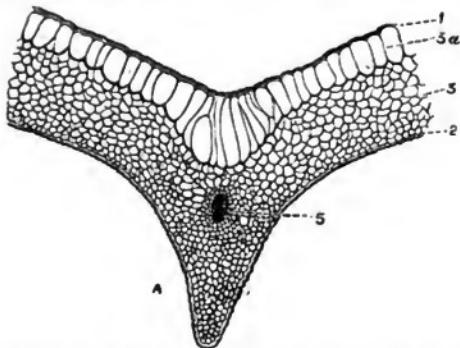


Fig. 11. Transverse section of leaf of *Cypripedium insigne* at the midrib, X 25. The numerals as before.

storage for water. The appearance of isolated bast-like fibre near the upper epidermis is significant of high development.

Cypripedium.—Fig. 10, *Cypripedium niveum*. The layer of long vertical prism-like cells underlying the epidermis might be mistaken

for palisade structure, but they contain no chlorophyll, and are colourless and filled with water. Beneath them is the chlorophyll layer of ovoid or globular closely packed cells, in the midst of which are the fibro-vascular bundles; the cells beneath these contain a purplish colouring fluid. Fig. 11, *C. insignis* closely resembles *C. niveum*, except that the cells of the mesophyll tissue are more uniform, and the lowermost contain no colouring fluid. Shade and a copious supply of water are the cultural indications to be derived from this structure.

Stems.—Transverse sections of the stems of orchids show generally the normal monocotyledonous structure. There is a well-marked epidermis consisting in stems of more than one year's duration of closely packed cells, covered by a hard cuticle more or less thickened; underlying the epidermis is a belt of corky tissue enclosing the central mass of parenchyma, the cells of which are soft and thin-walled; and in the last-named tissue are imbedded the fibro-vascular bundles more or less

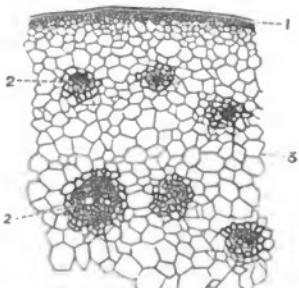


Fig. 12. A fragment of transverse section of stem of *Dendrobium nobile*, enlarged 30 diameters.
1, epidermis; 2, fibro-vascular bundles; 3, fundamental tissue.

isolated as shown in diagram of transverse section of stem of *Lelia purpurea* (Fig. 13A). In addition to these there is in some cases a layer of corky tissue developed between the epidermis and the fundamental tissue as shown in Figs. 14 and 15. Like the fibro-vascular bundles of the leaves those of the stem always consist of at least two elements, one of thin-walled cells called the bast or phloem, and the other, the xylem, of more or less elongated, thick-walled (prosenchymatous) cells that become hard and ligneous. The bundles of the stems are much more closely packed and usually of larger size than those of the leaves, and fill up a great part of the central mass that is surrounded by the corky tissue and impart to old stems their hard and ligneous texture. In the pseudo-bulbous and swollen stems of many orchids occur many cells rich in mucilage and others which are especially adapted for the retention of water and as storage for reserve material to be utilised by new growths.

The general structure of the stems of orchids will be readily understood from the annexed sections made from four species well known in cultivation. The development of a stem of a monopodial orchid is shown by transverse sections of the stem of *Vanda tricolor* (Figs. 14 and 15) at three successive periods of growth, and to give a clearer idea of the form of the individual cells fragmentary sections both transverse and longitudinal are given of the stem of *Cattleya intermedia* enlarged 200 diameters (Fig. 16).

Roots.—The general structure of the roots of orchids is described under the vegetative organs. As regards the minute structure the main

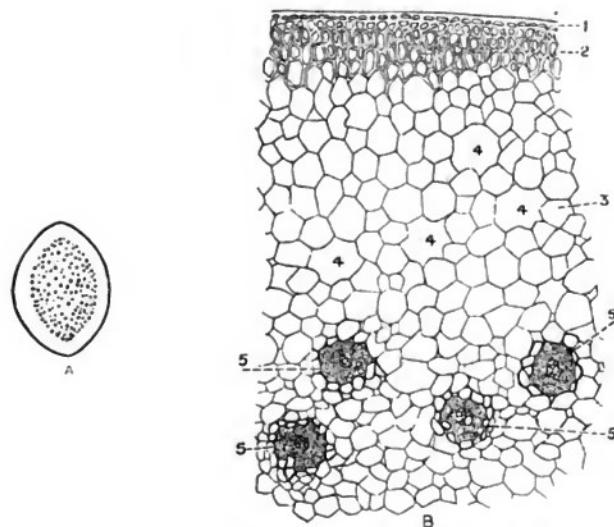


Fig. 18. Transverse section of stem of *Lelia purpurea*. A, enlarged 2 diameters. B, a fragment of the same enlarged 40 diameters.
1, epidermis; 2, hypodermal layers of thick-walled cells; 3, fundamental tissue; 4, air cavities in the fundamental tissue; 5, fibro-vascular bundles or woody fibres of the stem.

features are the same as those of other monocotyledonous plants. There is (1) an epidermis, not always well defined, and beneath this (2) a band of cortical tissue, which is much more developed in some genera than in others, and in aerial more than in terrestrial roots; in the former it consists of comparatively large thin-walled cells filled with water, and often with a fine spiral thread coiled within them. Underlying the cortical tissue is a layer of thick-walled cells (3) called the endodermis enclosing (4) the fundamental tissue of the root; and lastly there is (5) the axial cylinder consisting of bast and wood with ligneous

parenchyma and parenchymatous tissue composed of thin-walled cells. The details of the minute structure of the roots of orchids are well shown

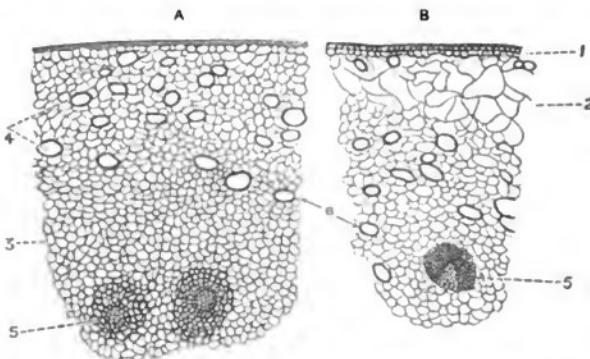


Fig. 14. Fragments of transverse sections of the young stem of *Vanda tricolor*.
 A, near the apex, with one layer of epidermal cells only. B, $\frac{1}{4}$ inch below A, showing epidermis with two layers of cells and the commencement of the formation of corky tissue.
 1, epidermis; 2, corky tissue developing from fundamental tissue; 3, fundamental tissue
 4 and B, bast-like cells; 5, fibro-vascular bundles.

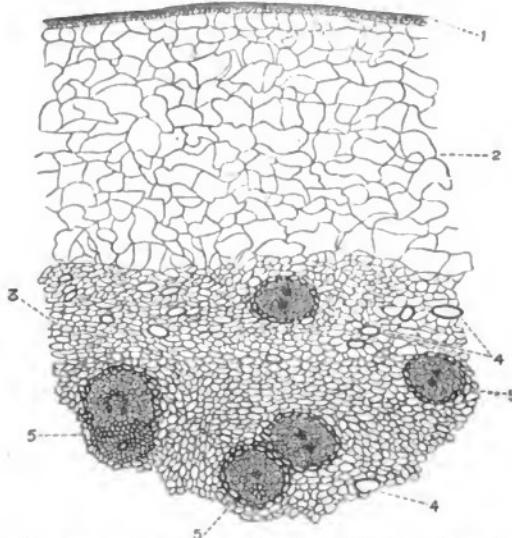


Fig. 15. Fragment of transverse section of older portion of stem of *Vanda tricolor* with (3) corky tissue well developed. 4, isolated bast-like cells.

in the accompanying sections selected from genera in different Tribes, and which may be regarded as fairly representative types of each.

The presence of chlorophyll in the aerial roots of orchids is noteworthy, and shows that the roots in these cases perform to some

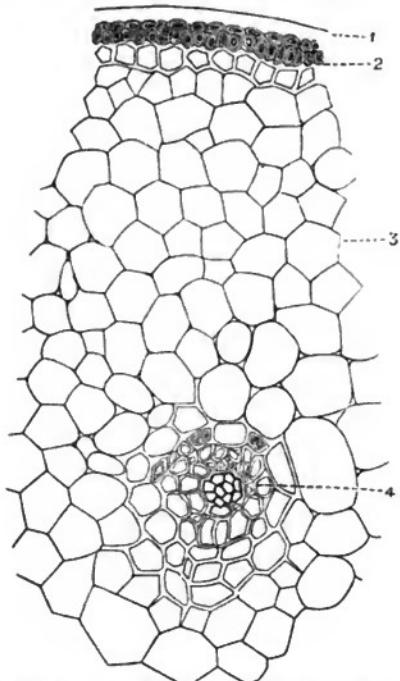


Fig. 16. Fragment of transverse section of stem of *Cattleya intermedia*, enlarged 200 diameters.
1, epidermis of one layer of thick-walled cells overlain by thickened cuticle ; 2, hypodermis of large thick-walled cells ; 3, fundamental tissue of soft thin-walled cells ; 4, a vascular bundle.

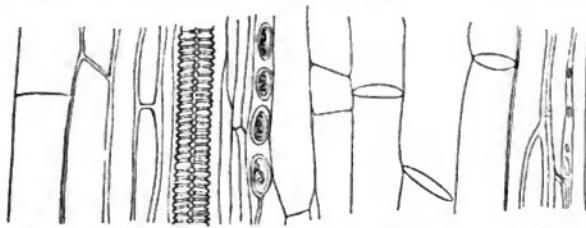


Fig. 17. Longitudinal section of a fragment of stem of *Cattleya intermedia*, from epidermis through a fibro-vascular bundle, X 200.
1, cuticle epidermal and hypodermal cells ; 2, fundamental tissue of soft thin-walled cells ; 3, a row of short thick-walled cells with granular protoplasmic contents ; 4, woody fibre ; 5, two contiguous spiral vessels ; 6, parenchyma.

extent the same functions as the leaves. Ordinary roots contain no chlorophyll.

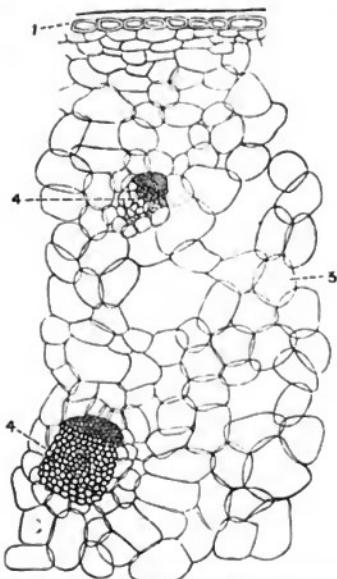


Fig. 18. Transverse section of fragment of pseudo-bulb of *Odontoglossum crispum*, enlarged 50 diameters.
1, epidermis; 2, fundamental tissue; 4, fibro-vascular bundles.

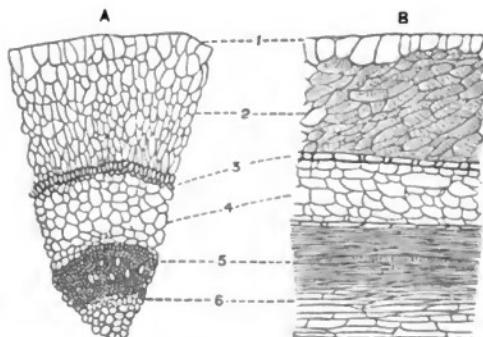


Fig. 19. A, transverse, B, longitudinal horizontally-placed section of root of *Dendrobium nobile*, from the circumference to the centre, enlarged 30 diameters.
1, epidermis; 2, cortical tissue of thin-walled cells; 3, endodermis; 4, fundamental or cellular tissue;
5, axial cylinder; 6, central pith.

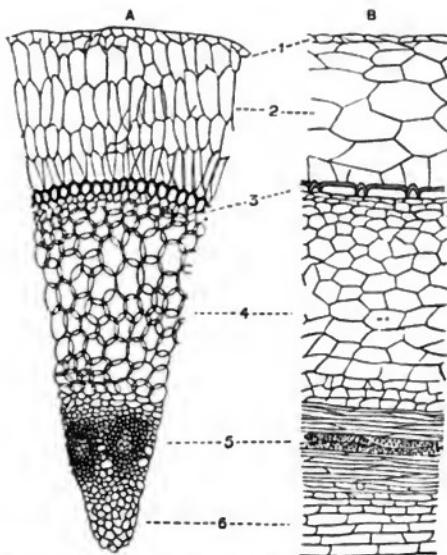


Fig. 20. A, transverse, B, longitudinal section of root of *Cattleya intermedia*, from the circumference to the centre, shown in a horizontal position, enlarged 30 diameters. The numerals as in Fig. 19.

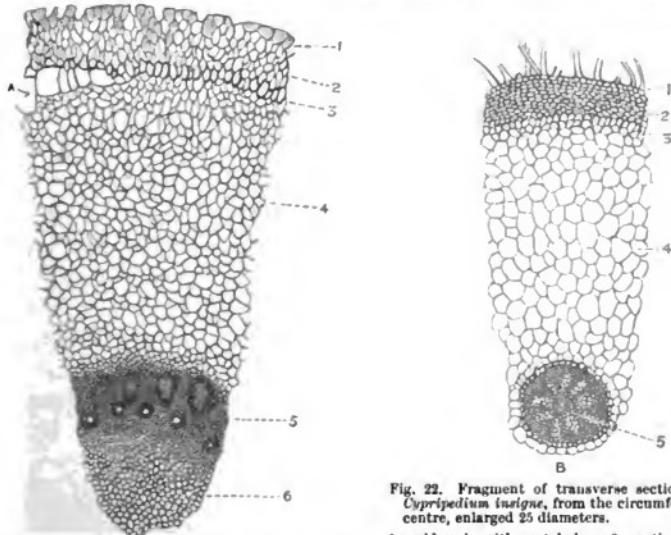


Fig. 21. A similar transverse section of root of *Vanda tricolor*, enlarged 25 diameters, showing development of corky tissue at A.

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Fig. 22. Fragment of transverse section of root of *Cypripedium insigne*, from the circumference to the centre, enlarged 25 diameters.

1, epidermis with root hairs; 2, cortical tissue; 3, endodermis; 4, fundamental or soft tissue of root; 5, axial cylinder of vascular bundles surrounding a central pith.

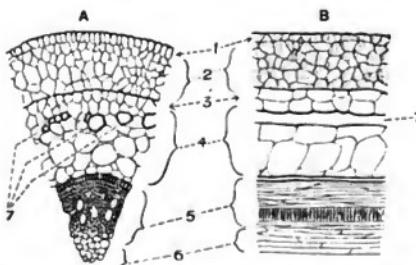


Fig. 23. A, transverse, B, longitudinal section of root of *Odontoglossum crispum* horizontally placed.
1, epidermis ; 2, cortical tissue of thin-walled cells ; 3, endodermis, consisting of a layer of cells with thickened walls surrounding ; 4, the fundamental tissue of the root ; 5, vascular bundles of the axial cylinder, forming the hard-wood tissue of the root ; 6, the pith ; 7, bast cells.

FERTILISATION.

One great inducement to the cultivation of epiphytal orchids is the length of time the flowers of most of the species continue in perfection after expansion. It is generally known that with some exceptions to be presently noticed, the cause of this duration is owing to their never becoming fertilised unless by some external agency ; they thence retain their attractiveness day after day awaiting the event for which they were created, but which under the circumstances of their environment rarely takes place unless artificially effected by the hand of the hybridist, or if, perchance, a bee attracted by the scent or colour of the flowers, enters the house in quest of honey, and alighting on the labellum makes its way to the nectary, removes the pollinia from one flower and deposits them on the stigma of another. The annexed figure represents a bee caught in our Cattleya house a few years ago, when



a goodly number of plants of *Cattleya Mossiae* were in bloom and also several plants of *Odontoglossum citrosum* ; the pollinia on the head of the insect are those of the *Odontoglossum* ; on the thorax between the wings are those of the *Cattleya*.*

* A plant of *Cattleya Mossiae* in a garden near Halifax is reported in the *Gardeners' Chronicle* of 1855, p. 614, to have borne three capsules whose fertilisation was ascribed to some bees that were observed flying about in the greenhouse in which the plant was suspended. The flowers of *Cattleya Mossiae*, as is well known, are delightfully fragrant, and honey is excreted from the base of the column.

To make a slight digression—It may be here stated that the duration of some orchid flowers is very remarkable; *Grammatophyllum multiflorum* retains its flowers with scarcely any perceptible change of colour for nearly one-third of the year; the flowers of some of the recently introduced Dendrobes with elongated spathulate petals (*D. Stratoceras*, *D. Strebloceras*), to which may be added *D. Dearei* and a few other eastern Malaysian species, continue in perfection for upwards of three months; many Cypripedes persist from six to eight weeks according to the season of the year, while the leathery flowers of some Vandas, Cymbidiums, and of other genera last nearly as long; the wax-like flowers of Aërides and Saccolabium generally retain their beauty from three to four weeks; and in the cooler atmosphere of the Odontoglossum house the Odontoglosses, Oncids and brilliant Masdevallias lose none of their gorgeous tints for as long a period. The duration of orchid flowers, apart from the absence of any fertilising agent is, however, influenced by the texture of their perianth segments; the delicate sepals and petals of the labiate Cattleyas, Thunia, Sobralia, Pleione, some of the Phalaenopsis, etc., succumb to the damp and heat of their environment sooner than those endowed with firmer texture. But whether the duration of the flowers be longer or shorter, the essential cause is the same, and this we now proceed to consider.

The evidence of the incapacity of most orchid flowers for self-fertilisation afforded by the common observation of their failure to do so under the artificial circumstances in which they are placed in this country, is rendered conclusive by an examination of their structure and of the various contrivances by which their fertilisation is effected. These contrivances, as Mr. Darwin has most eloquently and distinctly proved, "are as varied and almost as perfect as many of the most beautiful adaptations in the animal kingdom,"* but they have for their main object not the fertilisation of each flower by its own, but by the pollen of another flower. The agency by which this is effected is provided by the INSECT WORLD, and it has been abundantly demonstrated from direct observation that the flowers of the greater number of species of our native orchids are fertilised by the insects visiting them, and the process by which this is accomplished has been accurately described not only by Mr. Darwin but also by others who have followed in his footsteps.†

* *Fertilisation of Orchids*, p. 1.

† The earliest observer of the fertilisation of orchid flowers by insects was Christopher Konrad Sprengel. This remarkable man, the son of a clergyman, was born at Brandenburg in 1750. From 1774 to 1780 he was employed as a teacher in Berlin when he obtained the appointment of Head Master of the school at Spandau. During his residence at

The elaborate and interesting account which Mr. Darwin has given of his own observations and of the experiments he made to satisfy himself of the correctness of those observations and the conclusions which he drew from them are given in his oft quoted delightful work on *Fertilisation of Orchids*. He also proved that the fertilisation of many epiphytal orchids must depend on a similar agency, and he has described several interesting experiments which he made with flowers grown in the glass-houses of this country. Although we may safely conclude from these experiments and from their failure to set capsules under cultivation that a vast majority of the epiphytal orchids, especially those with large and showy flowers, in order to perpetuate themselves by seed must be fertilised by the aid of some external agent, it by no means follows that in a wild state all or even a considerable percentage of them are so fertilised. Actual observation in their native homes can alone determine the facts, and this has yet to be undertaken. Almost the only reliable information at hand has been supplied by Mr. H. O. Forbes, whose observations were limited to one small locality and to a comparatively few species. These observations, however, tend to show that a larger number of orchids are self-fertilising than was previously suspected, and of those for which insect aid is necessary a large proportion of the flowers remain sterile.*

Mr. Forbes' observations were carried on at Kosala, in West Java. Of the species with large flowers which possessed no visible means of self-fertilisation, a plant of *Cymbidium stapelioides* bore but one capsule, *Dendrobium crumenatum* had one capsule for every sixty flowers, and *Calanthe veratrifolia* also about one to every sixty flowers; Vandas also had but very few capsules. On the other hand fifteen species are named that are habitually self-fertilising, including *Phaius Blumei*, a geographical form of the widely dispersed *P. grandifolius*. From this very restricted range of observations and connecting with it the number of British orchids ascertained by Darwin to be self-fertilising, Mr. Forbes was led to conclude that the flowers of terrestrial orchids are more liable to self-

Spandau he devoted all his spare time to botanical pursuits, watching the wild flowers of the district at all seasons and in all weathers with unremitting patience and perseverance. In 1793 he published his curious and valuable work entitled *Das entdeckte Geheimniß der Natur* (The discovered Secret of Nature), containing the result of his labours. The little attention given to this work by men of science and the public generally seems to have greatly embittered him, for after its publication he abandoned botanical pursuits altogether, and returned to his former philological studies. He died in 1816.

* Journ. Linn. Soc. XXI. p. 538.

fertilisation than epiphytal ones, and that a large number of the latter never set capsules; but from such incomplete data it is evident that no just conclusion can be arrived at.

The number of self-fertilising orchids is, however, considerable, and additions to the list are frequently being discovered, but the total number of known cases is still an almost infinitesimal fraction of the whole number of species contained in the great Orchidean family. Mr. Darwin mentions ten species in *Fertilisation of Orchids*, Mr. Forbes adds those cited above and a few others; the late Mr. Fitzgerald, the author of the excellent monograph of Australian Orchids, and other observers have added to the list; and lastly, Mr. H. N. Ridley, in some notes published in the Journal of the Linnean Society* gives four others which he had himself examined, including *Trichopilia fragrans*, which although frequently is not constantly self-fertilising. Mr. Ridley also expresses his belief that among the small green-flowered orchids of the tropics many more instances may be found. In the four species to which his notes are chiefly confined, Mr. Ridley traces the cause of self-fertilisation, or Cleistogamy as it is technically called, and proceeds to describe four common methods by which this is effected; to these methods we shall again refer.

The epiphytal orchids observed in our houses to be cleistogamic or self-fertilising fall under two categories—those that are habitually so, and those that are not constantly self-fertilising. In the first category are *Chysis aurea*, Lindl., probably the first observed instance of cleistogamy among epiphytal orchids; *Dendrobium chryseum*, Rolfe, one of the subjects of Mr. Ridley's notes; an Australian form of *Phaius grandifolius*, figured in the *Botanical Magazine*, t. 6032, under the name of *P. Blumei Bernaysii* (thus in a measure confirming Mr. Forbes' observations on the Java form of the same species, but we have never observed the typical *P. grandifolius* to be cleistogamic); to these must be added *Laelia virens*, Lindl., *Acanthephippium Curtissii*, Rehb., an inferior variety of *Dendrobium Brymerianum* from Upper Burmah, and *Cypripedium (Selenipedium) Schlindii*, Batem.† In the second category—those observed to be occasionally cleistogamic are *D. cretaceum*, Lindl., *D. aqueum*, Lindl., *D. crepidatum*, Lindl.; and among hybrids, *Epidendrum × Obrienianum* and *Calanthe × Gigas* have set capsules apparently without any external aid. In the case of *Cypripedium Schlindii* and *Epidendrum × Obrienianum* seedlings have been raised from the capsules so produced, and the resulting progenies have conformed strictly to the parent plants.‡

* Vol. XXIV. p. 389.

† On the self-fertilisation of this species, see *Cypripedium*, p. 68.

‡ *Epidendrum variegatum*, occasionally seen in orchid collections, has been observed by Mr. Hart, Superintendent of the Botanic Garden, Trinidad, to be cleistogamic in a wild state. In a communication to the *Gardeners' Chronicle* (XXVI., 1886, p. 11), he shows how self-fertilisation is effected in this species.

Of the known causes that occasion self-fertilisation Mr. Ridley describes four of the commonest. 1, by the breaking up of the pollen masses and the falling of the dust either directly upon the stigma or into the lip, whence it comes into contact with the stigma. This can happen only in the case of orchids with pulverulent pollen as in *Cypripedium Schlimii* and the terrestrial kinds as *Ophrys*, *Neottia*, *Thelymitra*, etc. 2, by the falling of the pollen masses as a whole from the clinandrium into the stigma. This happens in the case of *Phaius grandifolius Bernaysii* and probably others. 3, by the falling forward of the pollinia from the clinandrium or anther cap, the caudicle and gland remaining attached to the column. Our native Bee Orchis, *Ophrys apifera*, is a well-known instance of this. 4, by the flooding of the stigma. The pollen masses remain in the anther cap while the stigma exudes so great a quantity of stigmatic fluid that it eventually reaches the edge of the pollinia which immediately emit pollen tubes. This is the case with *Chysis aurea*, *Laelia virens*, *Dendrobium aqueum* and probably others mentioned above; it seems to be the commonest method of self-fertilisation.

We cannot conclude our notes on the self-fertilising of orchids more appropriately than by quoting Mr. Darwin's own words.

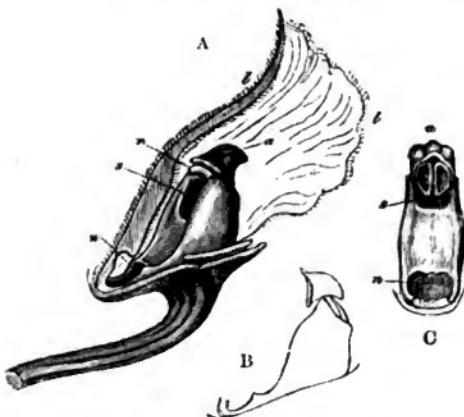
"Considering how precious the pollen of orchids evidently is and what care has been bestowed on its organisation and on the accessory parts; considering that the anther always stands close behind or above the stigma, self-fertilisation would have been an incomparably safer process than the transportal of the pollen from flower to flower. It is an astonishing fact that self-fertilisation should not have been an habitual occurrence. It apparently demonstrates to us that there must be something injurious in the process. Nature thus tells us in the most emphatic manner that she abhors perpetual self-fertilisation." *

Reverting again to the manifold and wonderful contrivances to be found in orchid flowers which subserve their fertilisation, we have in the Synopses of the Genera and Species occasionally noted peculiar structures which could have been designed for no other end.† From the many instances so lucidly described by Mr. Darwin we select one, *Dendrobium chrysanthum*, which, as he has pointed out, is interesting from being apparently contrived to effect its own fertilisation if an insect should accidentally fail to remove the pollen masses. By the kindness of the proprietors and publishers of *Fertilisation of Orchids* we are enabled to reproduce the original figure of this species showing how this is effected.

* *Fertilisation of Orchids*, p. 359.

† *Coryanthes macrantha*, p. 106; *Oncidium hians*, p. 44; also *Stanhopea*, *Mormodes*, etc.

"The rostellum has an upper and a small lower surface composed of membrane; and between these a thick mass of milky white matter is included, which can be very easily forced out. This white matter is less viscid than usual; when exposed to the air, a film forms over it in less than half a minute, and it soon sets into a waxy or cheesy substance. Beneath the rostellum the large concave but shallow viscid stigmatic surface is seated. The produced anterior lip of the anther (see Fig. A) almost entirely covers the upper surface of the rostellum. The filament of the anther is of considerable length but is hidden in the side view A behind the middle of the anther; in Fig. B it is seen after it has sprung forward; it is elastic and presses the anther firmly down on the inclined surface of the clinandrium which lies behind the rostellum. When the flower is expanded the four pollinia united



Dendrobium chrysanthum.

A. Lateral view of flower with the anther in its proper position before the ejection of the pollinia. All the perianth segments are removed except the labellum which is longitudinally bisected.

B. Outline of column viewed laterally after the anther has ejected the pollinia.

C. Front view of the column showing the empty cells of the anther after it has ejected its pollinia. The anther is represented hanging too low and covering more of the stigma than it really does.

a, anther; r, rostellum; s, stigma; l, labellum; n, nectary.

into a single mass lie quite loose in the clinandrium and under the anther case. The labellum embraces the column, leaving a tubular passage in its front; the middle portion is thickened as shown in Fig. A; the thickened portion extends up as far as the top of the stigma. The lower part of the labellum is developed into a saucer-like nectary which secretes honey.

"If an insect found its way into one of these flowers, the labellum which is elastic would yield, and the projecting lip of the anther would protect the rostellum from being disturbed; but when the insect retreats, the lip of the anther will be lifted up and the viscid matter

of the rostellum will be forced into the anther, gluing the pollen masses to the insect which will transport it to another flower. If this action be imitated artificially, by inserting the point of a pencil for instance, then owing to the inclination of the base of the clinandrium and to the length and elasticity of the filament, when the anther is lifted up it is always shot over the rostellum and remains hanging there, with its lower empty surface suspended over the summit of the stigma (Fig. C). The filament now stretches across the space which was originally covered by the anther (see Fig. B). If after having cut off all the perianth segments, the flower be laid under the microscope, and the lip of the anther be raised by a needle without disturbing the rostellum, the anther may be seen to assume, with a spring, the position represented sideways in Fig. B, and frontways in Fig. C. By this springing action, the anther scoops the pollen mass out of the concave clinandrium and pitches it up in the air with exactly the right force so as to fall down on the middle of the viscid stigma where it sticks.

"Under nature, however, the action cannot be as thus described, for the labellum hangs downwards, and to understand what follows the drawing should be placed in an almost reversed position (nearly upside down). If an insect failed to remove the pollinia by means of the viscid matter from the rostellum, the pollinia would first be jerked downwards on to the protuberant surface of the labellum placed immediately beneath the stigma. But it must be remembered that the labellum is elastic, and that at the same instant that the insect in the act of leaving the flower lifted up the lid of the anther and so caused the pollen masses to be shot out, the labellum would rebound back and striking the pollen masses would pitch them upwards so as to hit the sticky stigma.

"This view of the use of the elastic filament, seeing how complicated the action must be, may appear fanciful; but we have seen so many and such curious adaptations that one cannot believe the strong elasticity of the filament and the thickening of the middle of the labellum to be useless points of structure. If the action be as above described, it might be an advantage to the plant that its pollen masses should not be wasted if they failed to adhere to an insect by means of the viscid matter from the rostellum."* This contrivance is not common to all the species of *Dendrobium*.

The time that elapses from the pollination of the flower to the fertilisation of the ovules and thence to the maturing of the seed capsules varies considerably in the different genera and even in species belonging to the same genus. It was one of the discoveries

* *Fertilisation of Orchids*, pp. 172—177. In the text Mr. Darwin uses the words pollinium and pollen mass as if this species had but one, but it really has four like all other species of *Dendrobium*.

of Robert Brown that at the time of the expansion of an orchid flower the ovules are only in a rudimentary state, consisting merely of minute papillæ projecting from the pulpy surface of the placenta.* The application of the pollen to the stigma must have a twofold effect before the seeds can be perfected, first as a stimulant to induce the maturity of the ovules, secondly to fertilise them by means of the pollen tubes. It thence frequently happens, at least where artificial means are employed, that the application of alien pollen, the pollen of a different species and especially of a species belonging to a different genus may bring about the first but fail to effect the second, a circumstance that hybridists would always do well to bear in mind. Under the artificial circumstances in which tropical orchids are placed in the glass-houses of this country the period for both processes extends over several months, which is known to be much longer than is required in their native countries.

The chief causes of this prolongation is the deficiency of direct sunlight, especially in the winter when the sky is not only obscured by clouds often for several days in succession, but with the diminished altitude of the sun there is a corresponding diminution of intensity and potentiality in his rays. The capsules neither can nor do attain the perfection natural to them in their native countries, and it is more than probable that they yield but a fractional part of the quantity of good seed.

In the absence of direct observation, the time required by species of epiphytal orchids to mature their capsules in their native home can only be approximately surmised from the times ascertained for the same species cultivated in the glass-houses of Europe. The earliest recorded observations of these times were made by Dr. Hildebrandt, in the Botanic Garden at Bonn, during the spring of 1863, and the results of his observations were published in Mohl and Schlectendal's *Botanische Zeitung*, Nos. 44 and 45 of the same year. From these results we glean the following interesting facts:—

The first species selected was *Dendrobium nobile*, on account of its numerous large flowers supplying favourable subjects for accurate observation. A large number of these were pollinated in the first and second weeks in January, and one of them was examined by making transverse and longitudinal sections of the ovary at intervals of every two days. Some flowers were fertilised with their own pollen, and others with the pollen of a different flower, but no

* Observations on the Organs and Modes of Fecundation, p. 14.

discernible difference was observed in the result. The unfertilised flowers of *Dendrobium nobile* continue in perfection from twenty to thirty days according to external circumstances; the perianth of the fertilised flowers began to fade in two days after pollination; the upper part of the column began to thicken and gradually to become hemispherical in shape. Before the expiration of twenty days numerous pollen tubes began to descend into the ovary and to take a position alongside the placentas in six strong bundles, one on each side of the three placentas; the ovary itself thickened and lengthened from day to day with a corresponding development of the placentas. After the twentieth day each placenta divided into two ridges, each of which had produced numerous outgrowths in the form of minute papillæ, but as yet without a trace of a true ovule. At the end of two months, however, the placentas were covered with numerous ovules in different stages of development, the pollen tubes still lying fresh on each side of the placentas; the capsule had attained nearly its full size, but was still succulent and green. In from four to five weeks more the ovules were fully developed, and quite filled up the cavity of the ovary; the embryo-sac and its nucleus were distinctly discernible. Another ovary examined on April 22nd showed that although the ovules had considerably lengthened and the embryo-sac and its nucleus were enlarged, no pollen-tubes had yet made their way through the micropyles of the ovules. By the 12th of May the formation of the embryo had begun, the ovules had reached the size of the ripe seed and many of them had divided into two and three cells; only a few decomposed remains of the pollen-tubes were found. This proved that the period between pollination of the flower and the fertilisation of the ovary of *Dendrobium nobile* is about four months. In another fortnight nearly all the ovules were furnished with embryos, and the capsules subsequently ripened.

Similar investigations carried on simultaneously with those made of the fructification of *Dendrobium nobile* showed that in *Phaius grandifolius* the period from pollination to the fertilisation of the ovule is about two months, and in *Cypripedium insigne* about four months.* And in the case of some of the hardy terrestrial orchids the remarkable fact was elicited that their fructification is effected in a very much shorter time; thus, the period from pollination to the fertilisation of the ovules of *Listera ovata* (Tway-blade), *Neottia Nidus-avis*, and *Orchis pyramidalis* is only eight or nine days, and of *Gymnadenia conopsea*, *Orchis Morio* and *O. maculata* about a fortnight. The great difference in the periods of fertilisation between our native species and the epiphytal orchids is ascribed by Dr. Hildebrandt chiefly to climatic causes.

Dr. Hildebrandt's investigations were directed chiefly towards the

* The capsule of *Cypripedium insigne* is not ripe till several months afterwards.

ascertainment of the time that elapsed from the pollination of the flower to the fertilisation of the ovule, the remaining time necessary to complete the maturation of the capsule seems to have been regarded by him as a matter of subordinate interest, important as it is from a cultural point of view; this epoch is by no means easy to determine precisely, for although the dehiscence of the capsule may be selected as the epoch of maturity, experience has long since shown that under the artificial conditions in which cultivated plants are placed, the seeds are often in a fit state to germinate some time before the capsule dehisces. In our houses the time required for maturing the capsules of the *Cattleyas* of the *labiata* race ranges from eleven to thirteen months; for *Laelia purpurata* it is about nine months; for *Phalaenopsis Schilleriana* six months, *Cypripedium Spicerianum* eleven to twelve months, *O. insigne* ten months, *Odontoglossum maculatum*, *Dendrobium aureum*, *Anguloa Clowesii*, *Chysis bractescens* and *Bifrenaria Harrisoniae* each about twelve months, *Masdevallias* about four months, and *Calanthes* of the VESTITÆ section from three to four months. These periods are, however, only approximate; the time required for the ripening of the capsules is considerably influenced by the state of the weather and other external circumstances, especially by the amount of direct sunlight; in the warmer and drier climate of Paris the periods are somewhat shorter.

With the object of determining more accurately, if possible, the processes that take place from the pollination of the flower to the maturation of the capsules, a series of investigations were made in our houses in 1885-87. The subject selected for this end was the well-known *Cattleya labiata* var. *Mossiae*, Lindl., because we could command a large number of plants for the purpose; and because also the column and its parts are among the largest to be found in the ORCHIDÆ, the probability of obtaining useful results would thence be the greater. These results were formulated in a paper read before the Linnean Society in February, 1888, and from it we select the most salient points; to enable the reader to obtain a clear comprehension of these the following structural details are necessary.

The annexed figure (1) represents a front view of the column and ovary of *Cattleya labiata* var. *Mossiae* a few days after the expansion



Fig. 1.

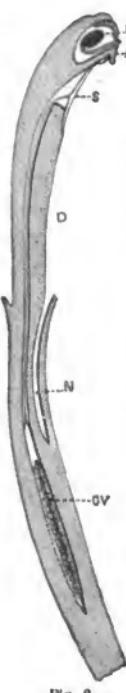


Fig. 2.

of the flower. From the apex or top of the anther Δ to the base \mathfrak{R} of the ovary it is nearly three inches long, although shown upright in the figure it slightly arches forward from below the stigma s to the apex; the part so bent is thence parallel with the labellum, which is in fact appressed to it and enfolds it with its side lobes, a circumstance that immensely facilitates the pollination of the stigma by insect agency. The stigmatic cavity is separated from the anther by a tongue-shaped rostellum R ; the stigmatic surface is coated with a thick layer of transparent viscid matter which holds the pollinia when applied to it with extraordinary tenacity. The pollinia are four in number; each pollinia or pollen-mass is a waxy flattened disk nearly the shape of an artist's pallet; the pollinia are attached to semi-transparent ribbon-like appendiculae, which are also covered with pollen grains. The ovary is cylindric and is traversed longitudinally by three equidistant sunk lines. Figure 2 represents a longitudinal section of the column and ovary, twice natural size, in which the position of the pollinia, rostellum and stigma are shown by the letters P , A and s respectively; D is the duct or canal leading from the stigma to the ovary and down which the pollen tubes pass; this canal in transverse section has the form of a W-shaped curve extending through the central part of the column where it is thickest; it is filled throughout with conducting tissue of very loose consistency, and formed of greatly elongated cells overlapping at their ends. The narrow slit at N is the nectary that penetrates into the ovary and in which honey is freely secreted; ov is the immature ovary; the parts of the ovary are shown more distinctly in fig. 3 of a transverse section twelve times enlarged. Each placenta at this early stage consists of two thickened plates; the papillæ that ultimately develop into ovules are placed along the projecting angles of these plates. The W-shaped duct along which the pollen tubes pass in their passage from the stigma to the ovary is shown in fig. 4, a section of the column made just below the stigma, and like the preceding figure twelve times enlarged.

On the 1st of June, 1885, forty-five flowers of *Cattleya Mossiae* were selected for pollination; these flowers were divided into three sets of fifteen each, of which one set was fertilised with their own pollen, a second set with pollen of different flowers but of the same variety, the third set with the pollen of flowers of a different species, *Laelia purpurata*, the whole of the pollinia being applied

in every case. The object of so varying the circumstances was to ascertain whether the fertilisation of the ovules and subsequent ripening

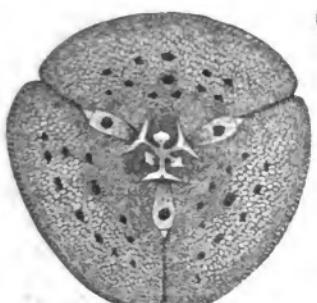


Fig. 3. Transverse section of ovary of *Cattleya Mossiae*.

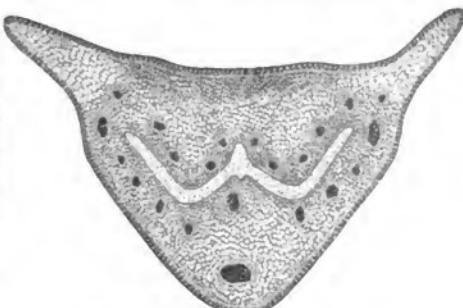


Fig. 4. Transverse section of column.
Both twelve times enlarged.

of the seed would be in any way differently influenced or affected thereby. It may here be stated that in the sequel no essential differences were observable. Two days after the operation, the floral segments had already become flaccid and showed signs of rapidly withering. Under the usual cultural treatment the flowers of *Cattleya Mossiae* retain their freshness for upwards of three weeks and even longer in cloudy weather; hence the effect of pollination on the floral segments becomes perceptible in a few hours. The pollinia were found to be in course of disintegration, forming with the viscid secretion from the stigma a gelatinous



Fig. 5. Groups of pollen granules and tubes.
Enlarged 250 times.

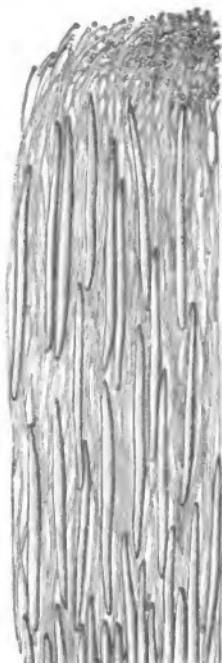


Fig. 6.

mass that quite filled up the stigmatic cavity. On examination under the microscope the pollinia were found to be breaking up into groups, generally of four granules, from some of which short tubes had already protruded. Four of these groups as seen under the highest power at our disposal (that is, magnified 250 times) are shown in Fig. 5. After a further interval of six days the floral segments had become quite withered, the epidermis of the column had become dull purple along the ridge, the tubes emitted from the pollen granules had increased immensely in numbers, and the foremost could be traced as far as the base of the column. Fig. 6 represents roughly the state of affairs at this epoch; the pollen-tubes as observed under a magnifying power of about 75 diameters are here seen passing downwards in vast numbers among the elongated cells of the conducting tissues.

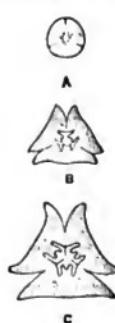


Fig. 7. The changes that take place in the ovary during the first month after the pollination of the flower are shown in Fig. 7 by transverse sections natural size in three different and successive stages of development, A at time of pollination, B a fortnight later. The change of form that had taken place in this short interval is very striking; the outline had changed from the circular to the triangular; the simple sunk lines of the earlier stage had widened into wedge-shaped clefts, dividing the whole into three well-marked carpillary lobes; each lobe had attained an almost triangular form by the enlargement of the placenta, and by the thickening of the walls of the ovary itself; C shows the further development at the end of the month; the placenta and rudimentary ovules had then begun to show a more definite form although no signs of impregnation of the latter could be detected. On the day section C was made, the pollen-tubes were found to have entered the ovary, and were pushing downwards along the sides of the placentas and among the ovules.

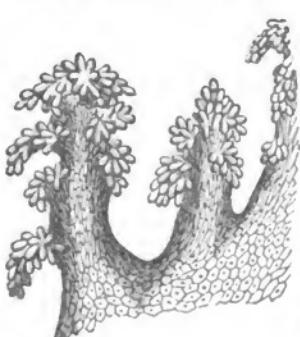


Fig. 8.

The condition of the rudimentary ovules themselves at this date is shown in Fig. 8, which is an enlarged view of a minute section; they were as the figure shows grouped in clusters of no very definite form and outline; each ovule has the appearance of a single cell, but so minute are they at this stage that no differentiation of parts could be made out under the low microscopic power to which we were restricted, although a faint reticulation was observable in some of the most advanced.

At the end of fifty-five days after pollination the pollen-tubes had penetrated the ovary in countless numbers, and had completely choked up the canal leading from the stigmatic chamber to it, but no actual impregnation of the ovules could be detected; the tubes lay alongside the placentas and among the ovules, and had reached as far as the bottom of the ovary. Twenty days later the ovules were not only enlarged but were also undergoing a change in form, and at the end of three months after pollination it became possible to understand with tolerable certainty the process by which the impregnation of the ovules is effected, and to get an idea of the space of time required for its accomplishment.

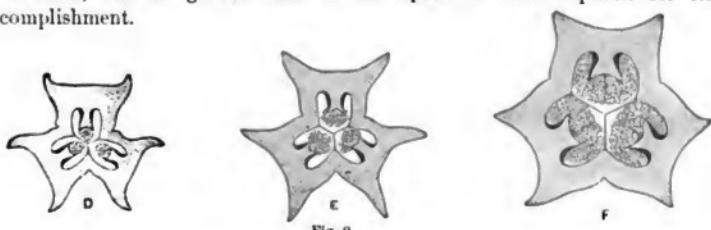


Fig. 9.

This will be best seen by reference to Fig. 9. D E and F represent two-thirds natural size three transverse sections of the ovary, D fifty-five, E seventy-two, and F ninety days after the pollination of the flower; these with the preceding sections form a series showing the development of the ovary at five different stages after the pollination of the flower. The development of the rudimentary ovules are also represented at the corresponding periods at A B C D and E in the next figure. This series simply shows the development of the rudiment to the perfectly anatropous ovule; it is at this stage that impregnation takes place.

The pollen-tubes push down into the ovary in countless numbers, and make their way along the placentas and among the protuberances of those that bear the groups of ovules in the manner shown in Fig. 11. The form of the perfect ovule may be regarded as nearly cylindric, being slightly contracted at the apex. The development of the impregnated ovule to the mature seed is shown in the annexed series in Fig. 12, all about 100 times enlarged. F is the perfect ovule, G is an intermediate form between F and H, H one month older than F, and I with nucleus *n* one month older than H. A group of such at this stage is represented in Fig. 13. The impregnated ovules had thence attained their mature form and size five months after the pollination of the

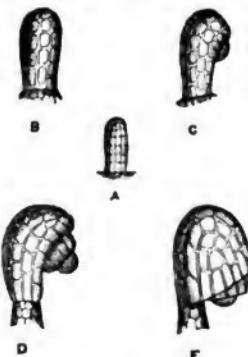


Fig. 10.

flower. At this period the days were getting short and cold, and artificial heat alone had to be depended on to maintain the plants in health, in consequence of which the investigations were stayed, it being previously known from experience that the seeds would not be ripe for some months to come. In fact the capsules that remained on the plants used during these investigations did not mature their seed and

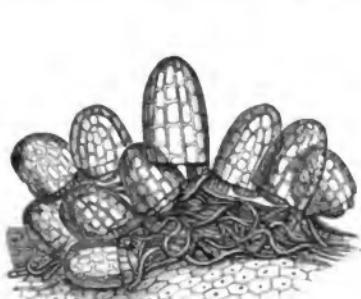


Fig. 11. A group of ovules and pollen-tubes, ninety days after pollination, X 150.

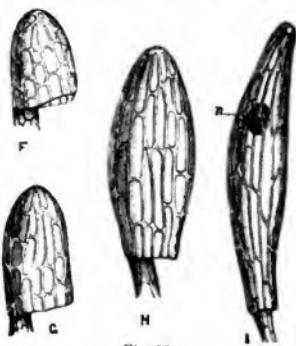


Fig. 12.

dehisce till the end of May, or nearly twelve months after pollination. A number of seeds were examined with the aid of the microscope; about one-half were found to be plump, the other half consisted of mere dust and shrivelled ovules.

From the foregoing observations the following general statements may be deduced.

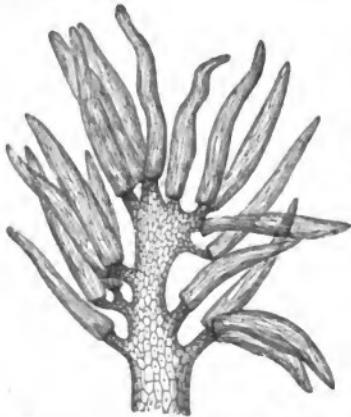


Fig. 13. A group of ovules five months after pollination, X 70.

The impregnation of the ovules of *Cattleya Moseleyi* under glass in the climate of London takes place from seventy-five to ninety days after the pollination of the flower, the length of time being doubtless influenced by the state of the weather during the interval and especially by the amount of direct sunlight the plants receive; the more direct sunlight the shorter the interval and *vice versa*.

A proportion of the ovules only are fertilised, but how great that proportion is, it is not possible to determine with certainty; it is never probably much less than one-half; it probably varies from a little less to a little more

than one-half. It is certain also that of the seeds which are apparently mature and good, a greater or less proportion of them fail to germinate under artificial conditions.

HYBRIDISATION.

The removal of the pollinia from one flower and the placing of them on the stigma of another is so simple a process that it is somewhat surprising so many years should have elapsed after the flowering of the first hybrid raised by hand* before the practice was generally taken up by the cultivators of orchids. But in fact, apart from the difficulty that always has been and perhaps to a great extent always will be experienced in raising seedlings, the prominent place attained by hybridisation in orchid culture was not anticipated for a long series of years, and so long as artificially raised orchids were restricted in numbers their scientific import was far from being fully recognised by the best orchid authorities. But now that the field of operations has become so greatly enlarged and progenies have been obtained from a great number of pairs of species distributed over many genera, the importance of the results whether viewed from a scientific or horticultural standpoint is more fully realised. These results in their horticultural bearing will be summarised in a subsequent section, our attention is here confined to a consideration of them in their scientific aspect.

One of the most interesting circumstances connected with artificial hybridisation is the means it has afforded of tracing the life history of many epiphytal orchids. The accompanying figures illustrate different states of development of four species selected from four different genera. They may be accepted as representative types of those four genera; for although among the numerous crosses effected between different species of the same genus, deviations in the shape and size of the different organs have been observed, in no case have the deviations been so great as to affect the general statement, especially in the earlier stages of growth.

The time that elapses from the sowing of the seed to the appearance of the first scale-like leaf or cotyledon and the first rootlet varies considerably in the different genera and also according to the season of the year; it is thence highly probable that in a wild state, especially in the case of those tropical orchids that live in a more equable

* This was *Calanthe* × *Dominii* which flowered in October, 1856.

temperature during the whole year, these periods are not only shorter but more uniform among different genera. The progress of development during the earliest stages of growth is also exceedingly difficult to trace without the aid of the microscope on account of the minuteness of the seed and the indistinctness of the first indications of growth. The first development of the cotyledon from the spindle-shaped seed discernible by the naked eye has the appearance of a thalloid body of irregular form but nearly always of the same contour in the same genus, and of a bright green colour indicating that the cells of the epidermis and underlying tissue are rich in chlorophyll. In *Cattleya* this thalloid body is at first a thickened disk, with an out-growth on the upper side which ultimately develops into the first pair of scale-like leaves; in *Dendrobium* it has a fusiform shape with a sharply pointed out-growth at one end, the rudiment of the first leaf; in *Phalaenopsis* it is prismatic with the angles much rounded; and in *Cypripedium* it is nearly flask-shaped. The subsequent development will be better understood by reference to the figures than from verbal description.

The period from the germination of the seed to the first flowering of the plant varies more in some genera than in others; thus, in *Cattleya* and *Laelia* (which are as regards hybridisation one genus, excluding some Mexican species referred to *Laelia*) the shortest recorded period is six years. *Laelia* × *caliglossa* raised by Dominy from *Cattleya labiata* and *Laelia crispa* was nineteen years before it flowered, but this is undoubtedly an extreme case. The periods in ten recorded instances ranged from seven to ten years, while those of some of the older hybrids were a little longer. In *Dendrobium* the period is usually four or five years; in *Phalaenopsis* from four to six years; in *Cypripedium* from four to six years with a few cases of shorter duration, but five years is recorded for more crosses than any other period. The shortest periods occur in the *Calanthes* of the *VESTITÆ* section; these usually flower from three to four years from the seed. Seedling Epidendra and Masdevallias flower in about four years. It is a remarkable fact that the period of terrestrial orchids from the germination of the seed to the first flowering of the plant, like the fertilisation of their ovules is much shorter than in the epiphytal species; thus *Disa* × *Veitchii* raised by Seden from *D. grandiflora* and *D. racemosa* flowered in twenty-one months from the sowing of the seed; and with *D. × Premier* raised by Mr. Watson at Kew from *D. × Veitchii* and *D. tripetaloidea* the period was still shorter.

The fact that most orchid flowers if fertilised at all must, in the wild state, be fertilised by insect agency being once recognised, it follows that where two allied species grow together or in close proximity to each other, the pollen of the one is liable to be deposited on the stigma of the other, and crosses may thence be



1 Seeds.



5 Seedling, 18 months.



2 Seedling, 4 months.



3 Seedling, 7 months.

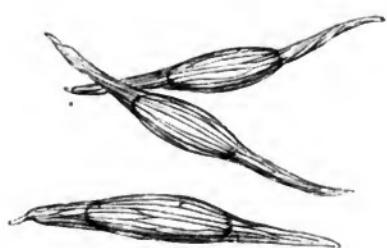


4 Seedling, 12 months.



6 Seedling, 2 years.

Development of *Dendrobium* from the seed to two-years old plant.
1 and 2 greatly enlarged, 3 to 6 natural size.



1 Seeds.



2 Seedling, 6 months.



5 Seedling, 16 months.



3 Seedling, 9 months.



6 Seedling, 2 years.



4 Seedling, 12 months.

Development of Cattleya from the seed to two-years old plant.
1 and 2 greatly enlarged, 3 to 6 natural size.



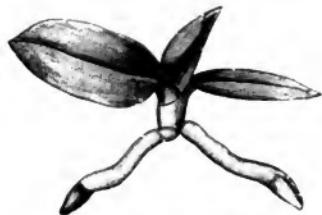
1 Seeds.



5 Seedling, 22 months.



2 Seedlings, 4 months.



6 Seedling, 2½ years.



3 Seedling, 9 months.



4 Seedling, 15 months.



7 Seedling, 3 years.

Development of *Phalaenopsis* from the seed to three-years old plant.
1 to 3 greatly enlarged, 4 to 7 natural size.



1 Eucypripedium Seeds.



5 Seedling, 12 months.



2 Selenipedium Seeds.



6 Seedling, 16 months.



3 Seedling, 6 months.



7 Seedling, 2 years.



4 Seedling, 9 months.

Development of Cypripedium from the seed to two-years old plant.

1 to 3 greatly enlarged, 4 to 7 natural size.

effected. This hypothesis and the structural evidence afforded by intermediate forms that have appeared among importations of geographically combined species have suggested that such forms are of hybrid origin. Direct proof of the existence of natural hybrids has now been afforded by identical forms artificially raised from the same pair of species as those from which the supposed wild hybrids were derived.

The first hybrid so obtained was from *Phalaenopsis Aphrodite* fertilised with the pollen of *P. rosea*, the resulting progeny was identical with the *P. intermedia* of Lindley. This *Phalaenopsis* first appeared as a solitary plant in a consignment of *P. Aphrodite*, sent to us by Thomas Lobb from the Philippine Islands in 1852. On its flowering in the following year, Lindley suggested that it might be a natural hybrid between that species and *P. rosea*;* this hypothesis was verified by Seden's hybrid which flowered for the first time in 1886. The shrewdness of Lindley's suggestion is greatly enhanced by the fact that at the time it was made no artificial hybrids were in existence, and wild ones do not appear to have been previously suspected. The significance of Seden's hybrid was two-fold, it was not only the first proof of the existence of wild hybrids but the first artificially raised hybrid in a genus proverbially difficult to cultivate.

When the late Professor Reichenbach published a description of a *Masdevallia* gathered by our collector Walter Davis on the lofty Andes of Peru, under the name of *M. splendida*,† and later a second form imported with it which he named *M. Parlato-reana*,‡ he suggested that both might be wild hybrids from *M. Veitchiana* and *M. Barveana* which occur together in that region, one being derived from the reverse cross of the other. An experiment was made in our houses by crossing the two supposed parent species both ways; progenies were raised from both crosses which on flowering proved identical with *M. splendida* and its variety *M. Parlato-reana*, for variety it proved to be, intermediate forms connecting the two occurring in both progenies.

The next proof obtained was a very remarkable one, for it was an artificially raised hybrid between *Odontoglossum Pescatorei* and *Od. triumphans*, the first hybrid *Odontoglossum* raised by us, and so far as we know the first to flower in England. It proved, however, to be identical with the *Od. excellens* of Reichenbach, who supposed that plant to be a natural hybrid between *Od. Pescatorei* and *Od. tripulans*; the hypothesis of the second parent was shown by the artificially raised hybrid to be false.

* Paxton's *Flower Garden*, III. p. 163.

† Gard. Chron. IX. (1878), p. 493.

‡ Id. XI. (1879), p. 172.

Another interesting hybrid obtained from *Dendrobium Wardianum* and *D. crassinode* flowered in our houses shortly afterwards. It proved to be identical with the *D. metawphthalmum* of Reichenbach, who recognised that plant as a wild hybrid between the same pair of species. And lastly, a hybrid raised by us from *Anguloa Clencesii* fertilised with the pollen of *A. Ruckeri* flowered contemporaneously with an imported Anguloa in the collection of Mr. R. H. Measures, of The Woodlands, Streatham, the two being absolutely identical.

The existence of wild hybrids in five genera has thus been proved by the raising artificially of identical forms from the same pairs of species as those from which the supposed wild hybrids have been derived. Of these five genera, *Odontoglossum* demands especial notice on account of the extent in which hybridity is known to prevail among the species inhabiting the Cordilleras of Colombia and Mexico, and to a less extent, owing to wider dispersion, among those occurring on the Andes of Peru. The Columbian species among which hybridity is most prevalent are *Odontoglossum crispum*, *Od. odoratum*, *Od. luteo-purpureum*, *Od. Lindleyanum*, *Od. Pescatorei* and *Od. triumphans*, most of them, particularly the three first-named, remarkably polymorphous, so that even where no traces of hybridity are discernible each species includes a multiplicity of forms between the extremes of which a rather wide difference exists. From these six species and their numerous varieties have arisen at least five extensive groups of hybrids that may be distinguished from each other and thus designated: *crispodoaratum*, *crispodo-Lindleyanum*, *crispodo-luteopurpureum*, *odorato-luteopurpureum* and *triumphante-Pescatorei*, including in each group also the reverse cross which it is perfectly logical to assume has taken place. In these groups but more especially in the first-named and somewhat hypothetically in the others, we have not only hybrids from crosses between the species and their varieties both ways, but also from crosses between the species and the progenies and from the progenies *inter se*, the result being a gradation of forms differing so little from each other as to be "confluent in series."*

Another group of wild hybrids belonging to the allied genus *Oncidium* has originated on the Organ Mountains of Brazil, where several species commonly known in gardens as the *crispum* group are aggregated, and which were at first regarded as species, but which after careful examination and comparison have been conclusively shown to be hybrids.† Among these are *Oncidium pectorale*, Lindl.; *On. Gardneri*, Lindl.; *On. prrostans*, Rehb.; *On. praetextum*, Morren; and others whose parentage can be satisfactorily traced.

* Among Mexican Odontoglosses several undoubted wild hybrids between *Odontoglossum maculatum* and *Od. Rossi* have been imported with those species, and a few others of which the last-named and *Od. cordatum* are the supposed parents.

† Orchid Review, vol I. p. 298.

Undoubted natural hybrids have also appeared among importations of *Lycaste*, *Cattleya* and *Laelia*, and even hybrids between *Cattleya* and *Laelia*, an admonition by Nature herself against placing too much stress upon any single character for separating genera in the ORCHIDÆ.*

Bigeneric hybrids have been obtained artificially by fertilising a species of one genus with the pollen of a species of another. The first bigeneric hybrid so obtained was raised by Dominy from *Phaius grandifolius* fertilised with the pollen of a variety of *Calanthe vestita*. Seden obtained a progeny many years afterwards from the first-named species fertilised with the pollen of another variety of *Calanthe vestita*, which on flowering proved to be structurally identical with Dominy's hybrid. *Phaius grandifolius* has also been crossed with *Calanthe* × *Veitchii* by several operators with more fertile results than the previous crosses; and lastly it has been crossed with *Calanthe Masuca*, from which a single plant only was raised. By these crosses a group of Phaiocalanthes has been brought into existence. Dominy also raised three distinct hybrids from *Hemaria discolor* crossed with an *Ancectochilus*, a *Dossinia* and a *Macodes*; the resulting progenies were called respectively *Anectochilus Dominii*, *Goodyera Dominii* and *G. Veitchii*, which would be regarded as a very curious nomenclature were it not that *Hemaria discolor* has been for many years cultivated under the name of *Goodyera discolor*, and both the *Dossinia* and the *Macodes* were, in Dominy's time, cultivated as *Ancectochili*. These hybrids are probably now lost, but the fact of their former existence is suggestive of a doubt whether the characters relied on to separate the genera from which they were derived are of sufficient value to justify the retention of all of them.†

Progenies have also been obtained from *Cattleya intermedia*, *C. Loddigesii* and *Laelia elegans*, each crossed with *Sophronitis grandiflora*, whence has originated a series of Sophrocattleyas. It is worthy of remark that in these three cases all the species concerned are natives of a comparatively small geographical area in southern Brazil; but another bigeneric hybrid in which the *Sophronitis* participated had

* Thus *Laelia elegans* supposed to have been derived from *Laelia purpurata* and *Cattleya guttata*, and *L. Schilleriana* from *L. purpurata* and *C. intermedia*, have been imported in considerable numbers. *L. amanda* and *L. porphyritis* are rare forms with unequal pollinia and are doubtless of hybrid origin with a *Cattleya* and *Laelia* for parents in each case, and quite recently two other such natural hybrids (*L. Gottiana* and *L. albanensis*) have been imported from Bahia.

† *Ancectochilus*, an Indo-Malayan genus of about eight species, is connected with the *Goodyeras* of Europe and North America by a series of genera, all more or less remarkable for their beautiful foliage. Of these *Herpsysma*, *Dossinia*, *Macodes* and *Hylophila* are monotypic.

for its second parent *Epidendrum radicans*, a native of Guatemala, several thousands of miles distant from the home of *Sophronitis grandiflora*. And lastly, two remarkable progenies have been obtained by crossing *Zygapetalum Mackayi* and *Z. marillare* each with *Colax jugosus*, which bear the name of *Zygocolax*. The number of bigeneric hybrids known to us, omitting Dominy's three from genera in the tribe NEOTTIEÆ, is nine, in the parentage of which seven genera are concerned counting *Cattleya* and *Lælia* as one.

Hybrids between *Cattleya* and *Lælia* have been raised by several operators, and exceed in number those between species of *Cattleya* and those between species of *Lælia* taken together, a fact so significant as to seriously question the retention of *Lælia* as a distinct genus except for certain Mexican species* with a distinct habit of growth, and which have hitherto resisted all attempts to hybridise them either with *Cattleya* or with the Brazilian *Lælias*.

One undoubted wild generic hybrid has been introduced from Guatemala, of which *Epidendrum aurantiacum* and *Cattleya Skinneri* are the parents. This was sent to us many years ago, a single plant only, by Mr. G. Ure Skinner and which was named *Cattleya guatemalensis*; the plant was afterwards lost. Another plant has recently reappeared in the collection of the Right Hon. Joseph Chamberlain at Highbury, near Birmingham, and which should bear the name of *Epicattleya guatemalensis*. The Aulizemum Epidendra come so near *Cattleya* structurally that the occurrence of a cross proving fertile between a species of the one and a species of the other locally associated is not surprising.† To this may with almost equal confidence be added *Cattleya Lindleyana* (Hort.), *Lælia Lindleyana* (nobis), a curious and extremely rare orchid that has been introduced from Santa Catherina in southern Brazil. Mr. Rolfe suspects that it may be a generic hybrid between *C. intermedia* and *Brassavola tuberculata*, both of which grow wild in the province of Santa Catherina.‡

The facts we have stated respecting generic hybrids naturally suggest the question, How will these bigeneric crosses affect the stability of the genera as at present circumscribed?§ Glancing over the whole range

* *Lælia anceps*, *L. albida*, *L. autumnalis*, *L. furfuracea*, *L. rubescens*, *L. superbiens*.

† This hybrid might be adduced in support of Reichenbach's proposal to merge *Cattleya* into *Epidendrum* (Xen. Orch. II. p. 26), but one bigeneric hybrid does not combine the two genera from which it sprung any more than one swallow makes a summer.

‡ Gard. Chron. V. s. 3 (1889), p. 437.

§ Hybridisation of Orchids, by H. J. Veitch, in Journ. Royal Hort. Soc. vol. VII. p. 34.

of hybridising operations and the results obtained from them, we may safely reply that thus far the stability of the genera (as established by Bentham) is scarcely affected, for the dozen or so of genera concerned in the parentage of these hybrids, both wild and artificially raised, falls far short of the number of those in which experiments have been made but which quite failed to produce results. Moreover, the progenies derived from these bigeneric crosses are extremely restricted; in more than one case a single plant only has been raised. The genera concerned can thence scarcely be said thus far to be affected by these crosses, but the systematic place of some of them seems to call for revision—thus Calanthe placed by Bentham in the sub-tribe *CÆLOGYNÆÆ* next to Pholidota has a much closer affinity with Phaius, and should be placed next to it in the sub-tribe *BLÉTIÆÆ*. Colax merged by Bentham into Lycaste should be restored and placed next to Zygopetalum, and Sophronitis should precede Tetramicra (*Leptotes*).

A special nomenclature that shall designate, so far as regards the genera, the origin of these hybrids is manifestly a most convenient one both for scientific and for garden use. We have therefore unhesitatingly adopted the course initiated many years ago by Dr. Maxwell T. Masters in naming a hybrid raised by Mr. Veitch Senior, at Exeter, from *Lapageria rosea* and *Philesia buxifolia*, *Philageria* × *Veitchii*, that is—by compounding in the most feasible way the names of the two genera concerned.

The hybrid raised artificially between any two species is not always exactly intermediate between them so far as can be discerned by the sum total of morphological or naked-eye characters. There is often a greater or less divergence towards one parent, especially in those cases in which a species has shown a very marked potency to hybridise with other species.

A few instances of such may be easily selected. Among Dendrobes *D. nobile* has strongly impressed its general features on every hybrid in which it has participated in the parentage whether as pollen or seed parent. Among Cypripedes the influence of *C. Spicerianum* is as strongly marked as *D. nobile* among Dendrobes. *C. Schlimii* has in like manner greatly preponderated throughout the large group of hybrids known as the *Sedenii* group, of which it is one of the original parents. *Cypripedium Fairieeanum* has proved a potent agent in hybridisation, but it has hitherto been used chiefly, if not solely, as the pollen parent. The characters of *C. villosum*, *C. insigne* and *C. venustum* have also much preponderated in the flowers of the progenies of which these species are the pollen parents.

Cattleya labiata and its Colombian varieties have been crossed with

nearly all the other species of *Cattleya* and with most of the Brazilian *Laelias*, with the almost universal result that the flowers of the progenies have deviated but little from the *labiata* type, but their colours are often much modified by the other parent.

Many instances can be cited in which the pollen parent has greatly influenced the characters of the flower, and the seed parent the vegetative organs of the progeny. On the other hand the opposite has occurred, so that it is at present impossible to deduce any general law respecting the relative potency as regards sex of the parents of those hybrids which diverge from the precise intermediate form.

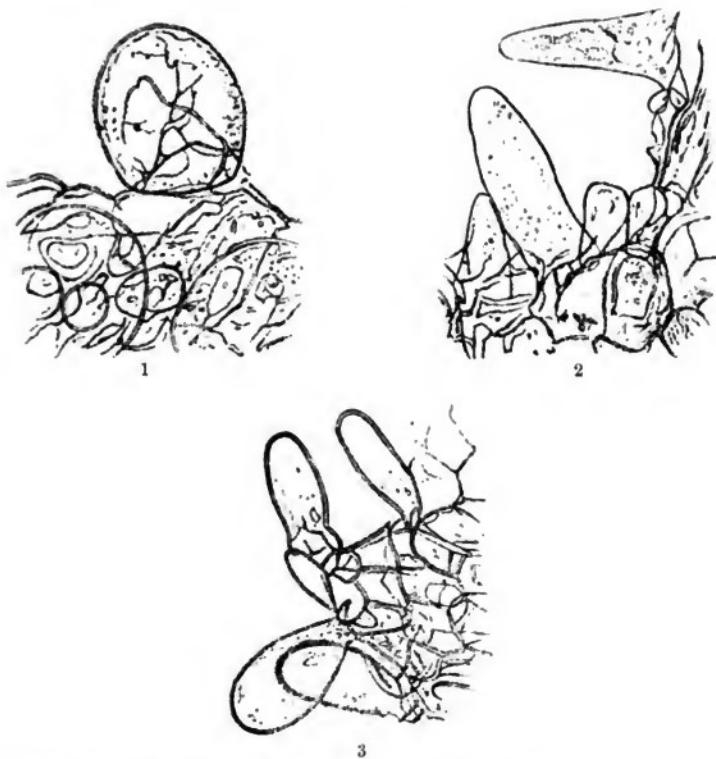
The reverse cross of any two species does not always produce identical forms with the first cross, although generally sufficiently near to be ranked as varieties only. There are, however, some very remarkable exceptions. *Cypripedium × Aphrodite* raised by us from *C. Lawrenceanum* ♂ and *C. niveum* ♀ is very distinct in form and colour from *C. × Antigonæ* raised from the reverse cross of the same pair of species.

When the minute structure of the tissues of hybrids and their parents are examined and compared, we learn from an exceedingly interesting series of investigations undertaken by Dr. J. M. Macfarlane in the laboratory of the Edinburgh Botanic Garden, that from a large number of hybrid plants together with their parents so examined and compared, the structural blending of the parents in the cells and cell contents in all the organs of the hybrid is nearly equal. The blending of the appearances presented by the parents is seen in a remarkable manner in all the minute anatomical details, in the size, outline, amount of thickening and localisation of growth of the cell-wall, in the structure of the epidermal out-growths, hairs, papillæ, etc., and also in the number of the stomata of the leaves. In the hybrids all these are as a rule, so far as the investigations have been carried, intermediate between those of the parents.*

The hybrid orchids examined by Dr. Macfarlane were, up to date of publication, confined to two raised by ourselves, viz., *Cypripedium × Leeanum* and *Masdevallia × Chelsoni*. An instructive instance is afforded by the flower of the last-named hybrid of the perfect structural blending of the two parents in the hybrid. *Masdevallia × Chelsoni* was raised from *M. amabilis* and *M. Veitchiana*, the cross being effected both ways and progenies obtained from both crosses. The brilliant coloration of the flowers of both the hybrid and its parents is, in part, owing to the crimson papillæ which are scattered in great numbers

* Gard. Chron. VII. s. 3 (1890), p. 543, and in Transactions of the Royal Society of Edinburgh, vol. XXXVII. p. 203.

over the surface of the sepals. When examined under the microscope the papillæ of *M. amabilis* are seen to be cone-shaped, those of *M. Veitchiana* are spheroidal, but those of the hybrid are club-shaped and exactly intermediate between those of the two parents. This is



Sections of epidermis from lateral sepals of—1, *Masdevallia Veitchiana*, bearing spheroidal hairs; 2, *M. amabilis*, bearing cone-shaped hairs; 3, *M. X Chelsoni*, bearing club-shaped hairs. All $\times 450$.

well shown in the accompanying illustrations which are copied from the plates in Dr. Macfarlane's paper, in the Transactions of the Royal Society of Edinburgh.

GEOGRAPHICAL DISTRIBUTION—CLIMATOLOGY.

The geographical distribution of the most important genera, in a horticultural sense, is fully sketched under each genus and further illustrated by maps on which the habitats of the species, so far as they have been ascertained, are indicated. It is only necessary to note here some general facts relating to the region over which the epiphytal orchids are spread and the climatic phenomena of that region. With the epiphytal orchids are associated some terrestrial and sub-terrestrial genera whose habitats lie within this region, as the Cypripedia (section SELENIPEDIA and sub-section CORIACEÆ), Phaius, Thunia, Spathoglottis, Calanthe and others. Its geographical limits may be broadly stated to be the 30th parallel of north and the 35th parallel of south latitude; the region of epiphytal orchids is thence a broad zone, having for its breadth a little more than one-third of the entire distance between the poles and, roughly speaking, including about three-sevenths of the land area of the globe. Beyond this zone the epiphytal orchids have spread only into two localities remote from each other, very sparingly indeed and as outlying members of the genera to which they belong, northwards into Japan and southwards into New Zealand. These two localities, together with some of the islands of the Pacific Ocean on which orchids included in tropical genera are found, are not shown on the maps illustrating the climate of the region.

But while the geographical limits of epiphytal and other orchids belonging to tropical types are those defined above, a very important modification has to be made with respect to the actual area over which they are spread. While the temperature of the whole region except on the summits of the higher mountain ranges is sufficiently high to maintain epiphytal life, there are extensive tracts within it where owing to physical causes the other equally essential condition, that of humidity, is either altogether absent, or is present in insufficient quantity, or for too short a period to enable epiphytal orchids to live.

Thus in the eastern section there are—in Asia, the Arabian deserts, the arid plains of Persia and north-west India, the table-land of the Deccan and Mysore; the greater part of the Australian continent; and

in Africa, the Sahara and Kalahari deserts north and south of the equatorial zone. In the western section there are—the arid region of northern Mexico in North America; the almost treeless regions known as the savannahs of Venezuela and Guiana, the Campos of Brazil and the Pampas of Bolivia and Argentina. Besides these larger tracts, there are many other places where, owing to local causes, the tropical rains are either intercepted or so greatly reduced in quantity that orchid life cannot exist. In all these tracts the atmosphere is not only almost always dry, but the daily thermometric range is also too great to admit of any but the scantiest vegetation to exist and that of certain types only.

The aggregate area of these dry and arid tracts is probably not less than one-half of the whole region, which reduces the actual area over which the tropical orchids are spread to about one-fourth of the land surface of the globe.

The general climatic phenomena of the region are dependent on the vertical position of the sun in respect to the earth; but the sun does not remain vertical over the same parallel of latitude owing to the obliquity of the earth's axis to the plane of the ecliptic, the great circle that traces the annual course of the sun in the heavens; the limits of the sun's annual excursion on each side of the equator are indicated by the tropics, which are nearly $23\frac{1}{2}$ degrees north and south of it. The sun is thence north of the equator one half of the year and south of it the other half. Now where the sun is vertical its heating power is greatest, and there accordingly the aerial currents known as the trade winds originate, evaporation is most rapid and the precipitation of rain the greatest. The heated air as it ascends is accompanied by the vapour raised by evaporation and which is lighter than the ascending air; both expand as they ascend and both part with a portion of the heat with which they were first charged until the vapour is sufficiently chilled to be precipitated first as cloud, then as rain. The parallel over which the sun is vertical with a narrow space on each side of it is known as "the region of calms." Of course this belt shifts with the annual course of the sun, and is thence at and near the equator twice in the year; and hence it is that the equatorial climate is more equable than in other parts of the region; the variations in temperature, both annual and diurnal, are least and the rainfall is most regular and continuous.

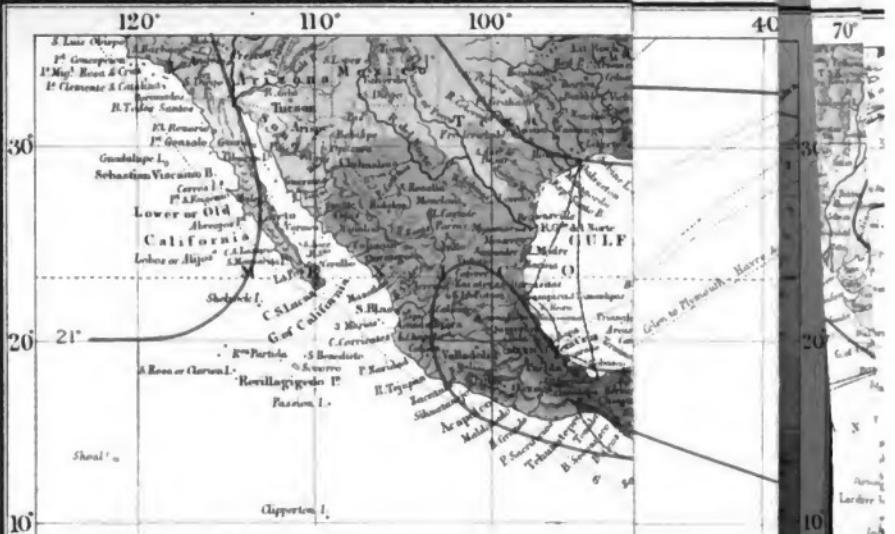
"When the sun is south of the equator the earth's surface north of it is no longer under the same influence but under that of the atmospheric currents flowing in from north or north-east to supply the place of the ascending heated air. The moving air owing to the great extent of land surface in the northern hemisphere is, at first, but slightly charged with moisture, and as it travels from north to south becomes warmer; it is comparatively a dry wind and consequently its capacity to contain vapour is continually augmenting. Similarly when the sun is north of the equator, the like phenomena occur on the south of it, but not equally so owing to the greater extent of ocean surface in the southern hemisphere. It is plain from these considerations that each place between the tropics must have its dry and wet season; dry when the sun is on the opposite side of the equator, and wet when the sun is overhead."*

The trade winds and the general phenomena just described where confined to the ocean are regular and constant, but on the continents they are subject to much variation, owing to the configuration of the land, the trend and height of the mountain ranges, and to many local causes; but generally speaking within the region under review the variations are periodical or seasonal.

The most extensive of these periodical changes are the monsoons which take the place of the regular trade winds in the Indo-Malayan region. The south-west monsoon loaded with vapour raised from the Indian Ocean when it meets the western Ghauts of India precipitates so much rain along the coast districts stretching from Bombay to the extreme south of India that some localities within it are the wettest spots known; similar phenomena occurs along the mountains of Aracan and Lower Burmah; and again along the lower Himalayan zone owing to the enormous amount of vapour ascending from the Bay of Bengal being drifted towards the mountains, and which being condensed by contact with the higher and colder zone is precipitated into the lower valleys, the precipitation increasing in amount in proceeding eastwards to the Khasia Hills and Manipur where it attains its maximum.

In the western hemisphere similar phenomena occur but on a smaller scale. Thus, in southern Mexico and Guatemala south-easterly winds prevail during the wet season from December to April, and north-westerly winds during the remainder of the year. The vapour raised in the south Atlantic Ocean during the sun's excursion between the equator and the southern tropic is carried by the south-east trade wind towards the Brazilian coast from Cape St. Roque to the Rio de la Plata and thence across the continent to the Andes. A large amount of this vapour is precipitated on and in the neighbourhood of the coast

* Tyndall, "Heat a Mode of Motion," p. 212.

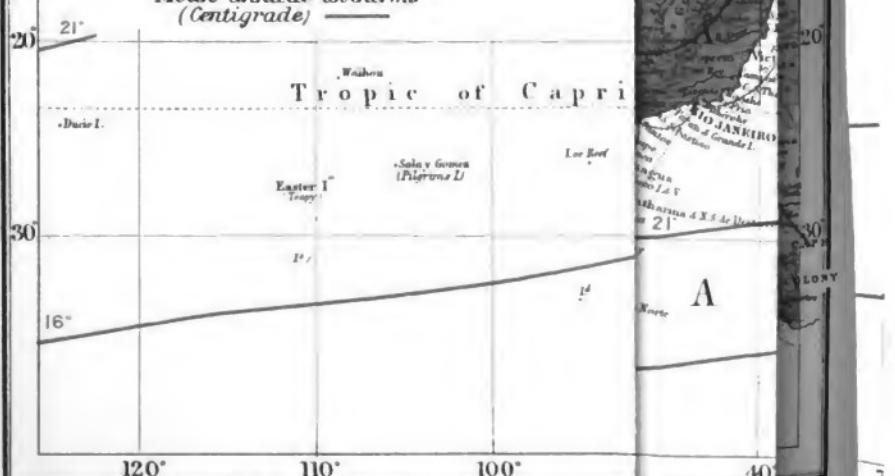


A Map shewing
 THE ANNUAL AVERAGE RAINFALL
 AND
 THE MEAN ANNUAL TEMPERATURE
 of the region of
**EPIPHYTAL ORCHIDS
 (WESTERN)**

REFERENCE
Rainfall

<i>Under 10 inches</i>	[White]
<i>10 to 30</i> "	[Light Gray]
<i>30 " 60</i> "	[Medium Gray]
<i>60 " 100</i> "	[Dark Gray]
<i>Over 100</i> "	[Black]

*Mean annual isotherms
 (Centigrade)* —



Waibus
Tropic of Capri

Daric L.

Easter I.
 Tropic

Sala y Gomea
(Pilgeria L.)

Lor Reef

A

16°

14°

Xerpe

120°

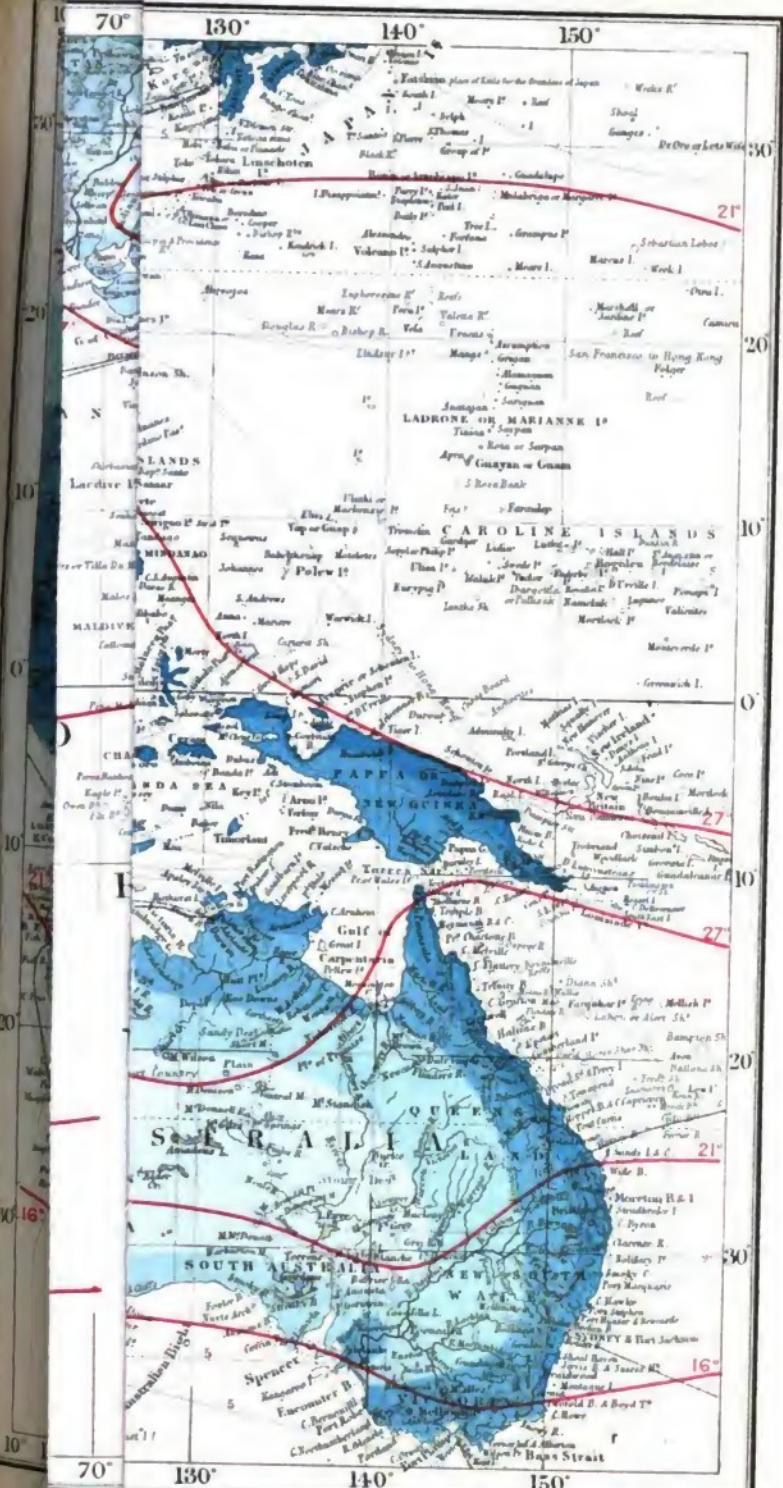
110°

100°

40°

70°

depth



London, Stanford's Eng^t Estab.

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range, the Serra do Mar. Similarly the enormous evaporation from the north Atlantic is constantly drifted towards the Cordilleras of Venezuela and Colombia by which it is arrested and condensed, the rains on the upper slopes of these mountains being continuous nearly throughout the year.

The distribution of orchid life over the region under review will now be clearly understood. Within what is often called the equatorial zone, a space extending to about twelve degrees on each side of the equator, and which includes nearly the whole of the Malaysian Archipelago and a great part of the continents of Africa and South America the climatic conditions are such that epiphytal and other tropical orchids are generally distributed, even in Africa, of whose tropical vegetation much yet remains to be investigated. It is within this zone that monopodial orchids attain their greatest development; in Malaysia are found gigantic *Stauropses* and *Grammatophyllums*; in Africa giant *Angraecums* cling to massive Baobab and Iron-wood trees; and of sympodial orchids gigantic *Eulophias* and *Lissochili* occur in certain places in the Congo and other regions of equatorial Africa in such quantities as to supply a feature in the landscape. Beyond this zone, both on the northern and southern sides, the distribution of orchid life is much more irregular, being immensely influenced by local causes, especially by the direction of the trade and periodical winds by which the evaporation of the ocean is carried into certain localities more than in others, and also by the height and trend of the mountain ranges.

A few well-known instances need only here be noted. In the eastern section—the mountains of Aracan and Moulmein which receive the south-west monsoon on their western slopes are the richest Dendrobie and Vanda districts known. The Khasia Hills and the lower Himalayan zone upon which, as already stated, is precipitated much of the enormous evaporation raised in the Bay of Bengal is also an exceptionally rich Dendrobium region, and is besides the home of the finest *Coelogynes* and *Cymbidiuns* yet discovered. In the western section—on the Cordilleras of Venezuela and Colombia are aggregated most of the finest *Odontoglotis*, *Cattleyas* of the *labiata* type, *Miltonias*, *Lycastes*, *Masdevallias*, and numerous others highly valued by cultivators, caused by the constant action of the north-east trade wind in rendering the climate peculiarly suited to orchid life. And from the action of the south-east trade wind, the coast range of Brazil with the country in its immediate vicinity is the home of many of the most beautiful *Cattleyas*, *Laelias*, *Oncids*, *Zygotetalums*, *Sophronites* and other orchids prized for their large and brilliant flowers.

On the mountain ranges of great altitude as the Himalaya in the eastern and the Andes of Colombia and Peru in the western section, the vertical range of orchids is considerable. On the Andes they ascend to elevations where the average annual temperature is less than in the lower and median latitudes of the temperate zone, some even ascending to the immediate vicinity of perpetual snow as *Epidendrum frigidum*, *Oncidium cucullatum* var. *nubigenum*, *Odontoglossum densiflorum*, and others. It must not, however, be inferred that such orchids are hardy, that is to say—that they can be cultivated in the open air in this or any other country equally remote from the equator. Those epiphytal orchids that occur at the highest altitudes, as the species just mentioned, some of the Odontoglossums of Colombia, the Masdevallias and Epidendra of Peru, etc., are never subjected to such extremes of temperature as is sometimes experienced in the south of France, in Italy, and the middle and southern States of North America, and under which they would perish. Apart from physical obstacles as the Himalaya in Asia, the Sahara in Africa, the arid tracts of northern Mexico and the Pampas of Argentina which prevent the spread of such orchids beyond their present sphere, climate alone would prove fatal to them.

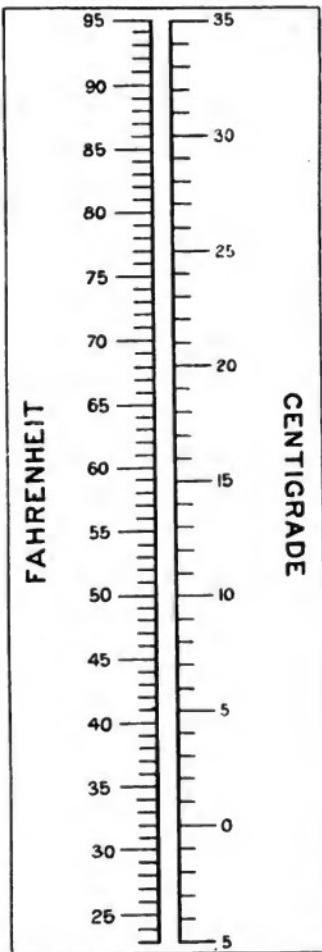
But little explanation is needed of the accompanying maps which have been prepared especially for this work by Mr. Edward Stanford, of Charing Cross. The red lines called isothermal lines, or simply isotherms, mark the limits of areas of equal temperatures expressed in degrees Centigrade for reasons to be presently stated; these are the annual mean temperatures at sea-level. The annual mean temperature of places above sea-level, especially on mountain ranges, may be approximately found by deducting one degree Centigrade for every 600 feet of altitude from the given mean. The gradations of blue colour indicate the annual average rainfall according to the references on the maps.

The following considerations should have weight in favour of the adoption of the Centigrade thermometric scale in horticultural practice in the place of the Fahrenheit scale.

The temperature of crystallisation or the freezing point as it is familiarly called, if the water be kept under the same pressure is constant; the normal pressure of the atmosphere at sea-level when the barometric column is 30 inches is about fifteen pounds to the square inch. The temperature of condensation from the state of steam, in common parlance the boiling point, is also constant as long as the pressure remains the same. There are thence two invariable standard points of temperature. On the thermometric scale the space between the freezing and boiling points was divided by Celsius into 100 equal parts whence this scale has obtained the name of

the Centigrade; it is now generally in use on the Continent and almost universally in scientific investigations. On Fahrenheit's thermometer, the instrument in common use in this country, the freezing point is marked 32° on an old assumption that the greatest terrestrial cold was zero, an assumption that has long since been proved in various ways and places to be fallacious; the boiling point is 212° , the interval between the two being 180° , so that 5 Centigrade is equal to 9° Fahrenheit. The annexed diagram shows the comparative value of the degree in each scale.

The division of the interval between the two invariable points into 100 parts is itself so suggestive and simple both in theory and practice as to require no justification. On the other hand, as already shown, the placing of the freezing point at 32° is quite arbitrary, and the division of the interval between the freezing and boiling points into 180 units is equally arbitrary, and so far as the number itself is concerned, is supported by no data derivable from ascertained thermal laws. Practically the Fahrenheit degree is too small to be appreciated by the most attentive of orchid cultivators, but to whom the Centigrade degree becomes an appreciable quantity, and consequently 5° , 10° , 15° C., etc., are recognisable conditions of temperature apparent to the senses. But such temperatures as are expressed by 40° , 50° , 60° F., etc., are complex notions rendered so by the circumstance that they do not themselves represent the number of units above an invariable point, but must be reduced to it by deducting the arbitrary number 32.



CLASSIFICATION.

In the early part of the century the ORCHIDEE were studied by several eminent botanists, including Oloff Swartz, one of the immediate successors of Linnaeus in the Chair of Botany at Upsal, L. C. Richard, Dupetit-Thouars, Dr. Robert Brown, C. L. Blume and others, all of whom have left special treatises on them.* It was especially the observations of Robert Brown backed by the excellent drawings of Francis Bauer which induced Lindley to devote himself to the order of which he became the great master. It was Robert Brown too, as Mr. Bentham justly observes,† who first established the principles of the classification of the ORCHIDEE on a solid basis, and on this basis as materials came to hand Lindley worked out, chiefly in the *Botanical Register* which he edited for many years, the systematic arrangement of the species which has supplied the foundation of every subsequent classification. The results of his labours are summarised in his *Genera and Species of Orchidaceous Plants*, the first portion of which appeared in 1830, the remaining parts being afterwards published at greater or less intervals, the concluding one being issued in 1840. Between 1852 and 1859 Lindley revised and re-systematised many of the genera, incorporating in them the accumulated fresh material, consisting of a vast number of new orchids of every description that had been discovered in the interval. These revised genera were published from time to time under the name of *Folia Orchidacea*.

Dr Lindley's system is thus summarised in the introduction to his *Genera and Species of Orchidaceous Plants*.

I.—Anther one only. (MONANDRE).

A.—Pollen masses waxy.

Tribe 1.—MALAXIDEE. No caudicle or separable stigmatic gland.

Tribe 2.—EPIDENDREE. A distinct caudicle but no separable stigmatic gland.

Tribe 3.—VANDEE. A distinct caudicle united to a deciduous stigmatic gland.

* See Literature of the ORCHIDEE, *infra*.

† Journ. Linn. Soc. XVIII. p. 282.

B.—Pollen masses powdery, granular or sectile.

Tribe 4.—OPHYDEÆ. Anther terminal, erect (adnate to the top of the column).

Tribe 5.—ARETHUSEÆ. Anther terminal, operculate (over the rostellum).

Tribe 6.—NEOTTIEÆ. Anther dorsal (behind the rostellum).

II.—Anthers two or three (Abnormal Tribes). (DIANDRE).

Tribe 7.—CYPRIPEDIEÆ. Ovary one or three-celled.

Tribe 8.*—APOSTASIEÆ. Ovary three-celled.

The *Genera and Species* and the *Folia Orchidacea* remained the authoritative systematic treatises on the ORCHIDÆ till the subject was taken in hand by Bentham for the *Genera Plantarum*, although Reichenbach had compiled a synopsis of the Order with the exception of the Tribe CYPRIPEDIEÆ in Walper's *Annales Botanices Systematicae* published during the years 1861–66. This synopsis was worked out mainly on the lines laid down by Lindley, the whole of whose *Folia Orchidacea* was incorporated in it, together with much fresh material that had been placed within the author's reach. It proved for the time a valuable source of reference for botanists.

Bentham also elaborated the ORCHIDÆ on the Lindleyan system with a few modifications of the Tribal divisions founded chiefly upon the characters of the appendage of the pollinia to which Lindley applied the common name of caudicle, but as already pointed out, he applied it to three very different parts of the polliniferous apparatus.† As the distinction set up by Lindley between the Tribes MALAXIDÆ and EPIDENDRIDÆ cannot be maintained Bentham has merged the first-named into EPIDENDRIDÆ. He has also merged ARETHUSEÆ into NEOTTIEÆ on the ground that "the separation has proved to be purely artificial without even the advantage of a constantly definite, distinctive character."‡ And lastly the small anomalous Tribes CYPRIPEDIEÆ and APOTASIEÆ are consolidated into a single one.

Mr. Bentham's Tribal divisions therefore stand thus:—

Tribe 1.—EPIDENDRIDÆ, including Lindley's MALAXIDÆ.

Tribe 2.—VANDEÆ, co-extensive with Lindley's VANDEÆ.

Tribe 3.—NEOTTIEÆ, including Lindley's ARETHUSEÆ.

Tribe 4.—OPHYDEÆ, co-extensive with Lindley's OPHYDEÆ.

Tribe 5.—CYPRIPEDIEÆ, enlarged by the addition of the anomalous genera *Apostasia* and *Neuwiedia*.

* Subsequently added.

† See page 29.

‡ Journ. Linn. Soc. XVIII. p. 286.

The first four Tribes are sub-divided into twenty-seven sub-tribes, often in reference to the vegetative characters of the included genera. These characters are stated under each sub-tribe that comes within the scope of this work and need not be repeated here.

The number of genera diagnosed by Mr. Bentham is 334, the authorship of which is thus analysed by Mr. Hemsley.

Leaving out Swartz, Ruiz and Pavon, Kunth, Dupetit-Thouars and others who between them established a considerable number of genera, the remaining genera retained by Bentham were founded by the following authors, Lindley, 114; Blume, 50; Robert Brown, 41; Reichenbach, 20. The last number does not include about half-a-dozen genera which Bentham had not seen and to which he was consequently unable to assign places in his classification. Bentham himself proposed only four new genera though he raised some of Lindley's sections of *Epidendrum* to the rank of genera. How far Lindley has left his mark on the genera of orchids may be gathered from the above analysis from which it may be seen that he established as many genera as Blume, Brown and Reichenbach together, or a little more than one-third of the total number retained by Bentham. The total number of names of proposed genera of orchids is about 770, or more than double the number adopted.*

Since the publication of the *ORCHIDÆ* in the *Genera Plantarum* a new classification has been worked out by Professor Pfitzer, of Heidelberg, in Engler and Prandl's *Natürlichen Pflanzenfamilien*. As this classification is not likely to supersede Bentham's, at least in Great Britain and America, we need only note a few of the changes proposed as indications of the tendency of the whole.

The number of genera is raised to 410 chiefly by adopting a large number proposed by Reichenbach whose herbarium types are now buried somewhere in Vienna; by adopting some proposed by other authors which Bentham had reduced to older genera or made sectional of them; and by a few proposed by himself. The fundamental divisions are those of Lindley but reversed, viz.—I., DIANDRÆ, with two or three fertile anthers, and II., MONANDRÆ, with only one, and more prominence is given to these divisions than by Lindley, notwithstanding the immense disparity between them as regards the number of included species. In the DIANDRÆ, *Cypripedium* is changed to *Cypripedium* evidently for etymological reasons; it is also restricted to the terrestrial species of the temperate zone. *Selenipedium* changed to *Selenipedium* is retained only for two curious species figured in Reichenbach's *Xenia Orchidaceæ*, I. pl. 2 under

* Gard. Chron. XX. (1883), p. 175.

the names of *S. Chica* and *S. palmifolium*: all the other species both Indian and South American are brought under a new genus which he calls Paphiopedilum. In the MONANDRE a group of species hitherto referred to Masdevallia including *M. pulvinaris*, *M. Octostylis*, *M. gibberosa* and others distinguished by the boat-shaped united lower sepals and free upper sepal and also by some characters of the inflorescence, are constituted a new genus under the name of Scaphosepalum. This genus will doubtless be generally accepted as it frees Masdevallia from an anomalous group of species that diverge too far from the type. Calanthe as circumscribed by Bentham is split up into four genera, the terrestrial species alone (section VERATRIPOLLE nobis) being retained under Calanthe; Lindley's Limatodes is restored in *C. rosea*; Reichenbach's Preptanthe is adopted for *C. vestita* and its allies, and a new genus called Calanthodium is created for the reception of *C. labrosa*. Don's Pleione is separated from Coelogyne, *C. Gardneriana*, Lindl., made sectional by Lindley as NEOGYNE is raised to generic rank under that name. All Bentham's sections of Zygopetalum, as Huntleya, Bollea, Pescatorea, etc., are restored to generic rank. *Vanda Cathcartii*, Lindl., is referred to Reichenbach's Esmeralda in preference to Blume's older genus Arachnanthe. A new genus Vandopsis is created for *Vanda Batemanii*, Lindl. But to continue the enumeration of the changes proposed by Dr. Pfitzer would more than weary the reader.

In this work, which is confined to cultivated species and hybrids belonging to the Tribes EPIDENDREÆ, VANDEÆ and CYPRIPEDIEÆ, the sub-tribal divisions as defined by Bentham are strictly followed. Bentham's genera also are adopted with the exception of a few which he had reduced to others, but which we have restored for reasons given under each.

The number of species of orchids has been variously estimated from 5,000 to 10,000, the enormous disparity arising from the different views respecting the limitation of species entertained by different botanists. The lowest estimate is that of Mr. Bentham, with whom British botanists are generally in accord, while the higher estimate is accepted by those who incline to the practice of the late Professor Reichenbach. The limitation of species recognised in this work is that of the eminent French naturalist, and quoted by Professor Duncan in his address to the Linnean Society at the anniversary meeting in 1884. Lamarch defined a species as—

"A collection of similar individuals which were produced by other and similar individuals. This definition is exact, for every living thing *nearly* resembles that which produced it. That the species is constant

is not true; it is not distinguishable by invariable characters. Species only have a constancy relational to the duration of the circumstances under which the individuals have lived."

If we accept this definition of the species, it is evident that plant forms of similar origin and structurally resembling each other may be brought under one species if safeguarded by the precaution not to allow too great expansion in application. On the other hand there is a tendency among some continental botanists and also among horticulturists both British and foreign to adopt as specific every deviation from a certain type; the number of species of orchids may thence be indefinitely multiplied.

The affinities of the *ORCHIDÆ* are remote. Bentham places them between *BURMANIACEÆ* with which they agree in the structure of the seed, a family of over fifty species dispersed over the hotter regions of the globe in both hemispheres, not one of which is probably in cultivation in other than botanic gardens, and *SCITAMINEÆ*, a much larger family, also tropical and including genera with a habit by no means unlike that of many orchids. The Irids have often been likened to orchids on account of the remarkable and gorgeous colours of the perianth segments of many species.

A RETROSPECT OF ORCHID CULTURE.

The earliest attempts to cultivate epiphytal orchids in this country were crude and unsatisfactory. Such would naturally be the case in the almost total absence of any certain knowledge of their nature and habits in their native homes; and moreover the glass-houses into which they were introduced were of very imperfect construction both as regards heating and ventilation. It was therefore not to be wondered at that under these circumstances, orchid culture at its commencement should have been disappointing.*

One of the first tropical orchids that became established in British hot-houses seems to have been the *Vanilla* which was known to Miller, the second edition of whose *Dictionary of Gardening* was published in 1768;† it is uncertain which species was cultivated by Miller, probably more than one. Miller also enumerates several species of *Epidendrum*, some of which must have been known to him in a living state, for he says:—"The plants cannot by any art yet known be cultivated in the ground, though could they be brought to thrive, many of them produce very fine flowers of uncommon form." Three species sent from America, which he planted with care in pots and placed in a stove, produced flowers, but the plants soon after perished.

In 1778, Dr. John Fothergill brought home from China among other plants introduced for the first time *Phaius grandifolius* and *Cymbidium ensifolium*;‡ the first-named flowered shortly afterwards in the stove of his niece Mrs. Hird, at Apperley-Bridge, Yorkshire. In 1787, *Epidendrum cochleatum* flowered for the first time in this country in the Royal Gardens at Kew, and *E. fragrans* in the following year. The last-named species was also brought from the

* Much of what follows is reproduced from a paper read before the Royal Horticultural Society, June 11th, 1889, by H. J. Veitch, on Orchid Culture Past and Present, and subsequently published in the Journal of the Society.

† A dried specimen of *Bletia oreocunda* was sent to Peter Collinson in 1731 from Providence Island, one of the Bahamas; but the tuber appearing to have life in it, he sent it to the garden of a gentleman named Wager, where it was placed in a hot-bed and grew and flowered in the following summer. This was probably the first tropical orchid cultivated in England.—*W. B. Hemsley* in *Gard. Chron.* l. s. 3 (1887), p. 381.

‡ *Bot. Mag.* sub. t. 1924.

West Indies in 1789 by Commodore Gardner, and presented by him to the Apothecaries' Garden at Chelsea, where it was cultivated by Mr. Fairbairn, the Curator, in pots of earth composed of rotten wood and decayed leaves, plunged into the tan bed of a pit.* In 1794, fifteen species of epiphytal orchids are recorded as being cultivated in the Royal Gardens at Kew, most of which had been brought from the West Indies by Admiral Bligh and other officers employed in that region. They included *Ornithidium coccineum*, *Oncidium altissimum*, *On. carthaginense*, *Lycaste Barringtonia*, *Epidendrum ciliare*, *Isochilus linearis*, etc., all of which at that time were referred to *Epidendrum*. They were cultivated in the stove in very great heat with fragments of half-rotten bark at their roots. Before the end of the century ten more species were added to the list, but none of them of any interest horticulturally.

As a consequence of the political circumstances of the times, the first epiphytal orchids received in England were brought from the West Indies, chiefly from Jamaica, by naval officers and by captains in the merchant service who gave no certain information respecting the habits of the plants and their environment in their native country beyond the bare fact that nearly all of them grew upon trees. They were thence believed to be parasites like our Mistletoe, a belief that became so firmly rooted that it prevailed for many years even after their true nature had been ascertained. The prevalence of this belief was prejudicial to the progress of orchid culture, for it induced attempts at cultivation that were necessarily futile. The editor of the *Botanical Register* under *Epidendrum nutans*, tab. 17 (1815), quaintly remarks that "the cultivation of tropical parasites was long regarded as hopeless; it appeared a vain attempt to find substitutes for the various trees each species might affect within the limits of a hot-house."

Nevertheless epiphytal orchids continued to be imported, and even in those days when a voyage to or from the West Indies occupied two months, their extraordinary tenacity of life after removal from the trees on which they were found growing was observed. Of the treatment the plants received we can only here and there catch a glimpse from the occasional notes that appeared from time to time in

* Id. sub. t. 152.

the *Botanical Magazine*, which had been founded by William Curtis in 1787, and from the earlier volumes of the *Botanical Register*, founded by Sydenham Edwards in 1815. From the foregoing extracts and from others of a like kind we gather that the first introduced epiphytal orchids were generally potted in mould formed of decayed wood and leaves, but sometimes in a mixture of loam and peat, and that the pots were kept constantly plunged in the tan bed of the stove. That they should soon succumb to such treatment seems to orchid growers of the present day a very natural consequence; nevertheless it was persisted in for many years.

The first fifteen years of the present century were overshadowed by the Napoleonic wars which retarded every art that can only flourish in times of peace. But yet, in the very throes of that tremendous struggle, the Horticultural Society of London was founded and obtained its charter of incorporation in 1809. From that epoch horticulture may be said to have entered into public life and to have received an impetus it never could have had from the isolated efforts of private individuals. Orchids, till then regarded more as curiosities than as subjects to be seriously taken in hand culturally, began to attract more notice; Messrs. Loddiges began to cultivate them for sale in their Hackney nursery about the year 1812, and they continued to be the principal commercial cultivators of them in Europe till the breaking up of their establishment in 1852. During this long period, the number of orchids introduced for the first time into cultivation by Messrs. Loddiges was very considerable and the influence obtained by the firm as authorities on orchid culture proportionately great, of which the contemporary botanical and horticultural literature affords ample evidence. About the year 1812 or a little later Dr. Roxburgh sent from India the first Vanda, the first Aërides, and the first Dendrobium that were seen alive in England. In that year too Messrs. Loddiges received a plant of *Oncidium bifolium* from a gentleman who brought it from Monte Video, and who informed them that it was hung up in the cabin without earth and continued to flower during a great part of the voyage home;* a statement that was then regarded as a traveller's tale and beyond the limits of credulity.

* Bot. Mag. sub. t. 1491.

The "air plants" as the Vandas, Aërides and *Saccolabiums* were then called, were a puzzle to the horticulturists of the second and third decade of the present century, and how profound was the prevailing ignorance of their true character may be judged from the following extract from the *Botanical Register* for 1817 under tab. 220, *Aërides (Sarcanthus) paniculatum*:—"Air plants possess the faculty of growing when suspended so as to be cut off from all sustenance but that derived immediately from the atmosphere. Plants of other genera of this tribe, and even of a different tribe are endowed with a like faculty; in none, however, can such insulation be considered as the state of existence which suits them best, but merely as one they are enabled to endure, as a carp is known to do, that of being suspended out of water in a damp cellar."

To keep alive an air plant for any length of time and to flower it was regarded as a feat of extraordinary interest. The first who seems to have accomplished it was Mr. Fairbairn, the gardener at Claremont, who flowered *Aërides odoratum* in 1813. How he succeeded may be related in his own words:—"I put the plant when first received into a basket with old tan and moss and hung it up in the pine house where it was exposed to the summer sun and to the fire-heat in winter. A tub of water was placed near it into which I could plunge the basket six or seven times a day, or as often as I passed it."* Some years later the same excellent gardener flowered *Renanthera coccinea* for the first time in this country.†

Towards the end of the second decade of this century Sir Joseph Banks had devised one of the most successful modes of treating epiphytal orchids then known and which he practised in his hot-house at Isleworth:—"He placed the plants separately in light cylindrical wicker baskets or cages of suitable width, of which the frame-work was of long slender twigs wattled together at the bottom, the upper portion being left open that the plant might extend its growth in any direction and yet be kept steady in its station, the ends of the twigs having been tied together by the twine that suspended the whole from the wood-work of the stove. A thin layer of vegetable mould was strewed on the floor of the basket on which the rootstock was placed and then covered slightly over with a sufficiency of moss to shade it and preserve a due degree of

* Trans. Hort. Soc. Lond. vol. VII. p. 499.

† See p. 130.

moisture."* This was the first rude forerunner of our modern orchid basket and the first instance we find recorded of moss being used for surfacing. About this time we find Dean Herbert experimenting in orchid culture. In a letter to the secretary of the Horticultural Society of London, and published in the Transactions of the Society for the year 1820, he writes:—"I found no difficulty in establishing Epidendra on the stems of a tree by cutting a notch in the bark and inserting the plant like a graft and tying moss about it to support it till the young roots had attached themselves to the bark, but for want of sufficient moisture they did not make much progress. I have since adopted the following method of irrigating them—by placing above them a pot of water with a hole at the bottom through which a string passes nearly as large as the aperture, by means of which the water is gradually and continually conducted to the upper part of the parasitical plant." From the context it appears, however, that the idea of supplying water to orchids in this manner had been communicated to him by Dr. Wallich, Director of the Botanic Garden at Calcutta, and who had used a similar contrivance there.

Loddiges at this time made their compost of rotten wood and moss with a small quantity of sand. Their orchid stove was heated by brick flues to as high a temperature as could be obtained by that means, and by a tan bed in the middle kept constantly moist by watering and from which a steamy evaporation was rising at all times without any ventilation from without. In 1825, they had in their stoves eighty-four species included in about thirty genera. Their method was imitated by probably all cultivators of orchids at that epoch, and into such hot steamy places orchids were consigned as soon as received, and into which, it was occasionally remarked, it was as dangerous to health and comfort to enter as it was into



Orchid basket used by Sir Joseph Banks in 1817. The plant is *Sarcocentron paniculatum*.
(Copied from the *Botanical Register*.)

* Bot. Reg. III. sub. t. 220.

the damp close jungle in which *all* tropical orchids were then supposed to have their home.

About this period 1823—25 a change in the method of treating epiphytal orchids was made in the Royal Gardens at Kew. A portion of the end of the propagating house was set aside for them, and a bed was formed consisting of loose turf soil interspersed with small portions of stems of trees on which plants were placed where many of them grew freely for a time, most of them rooting into the soil and clinging to the pieces of wood.* The only result obtained by this mode of treatment was, that the plants lived on a little longer than they had previously done. During the period 1824—27, Mr. Lockhart, Curator of the Botanic Garden, Trinidad, sent to the Royal Garden many of the orchids indigenous to the island including *Stanhopea insignis*, *Oncidium Papilio*, *Cataselum tridentatum*, *Ionopsis pallidiflora*, and others, some of them being sent growing on portions of branches as cut from the trees, and which being accompanied by instructions from Mr. Lockhart as to how they should be treated, eventually led to some improvement in orchid culture in England.

The want of success that attended the preservation of the plants for any length of time was supposed to be due to some peculiar difficulty in their cultivation, and it was resolved that an attempt should be made in the garden of the Horticultural Society to overcome it. A stove was accordingly set apart for their exclusive culture, and when subsequently Mr. (afterwards Dr.) John Lindley was appointed assistant secretary to the Society, the chief direction of it fell into his hands. "All the earliest experiments were unsuccessful, the plants were lost as quickly as they were received, and when a single specimen was preserved out of an entire collection, some success was thought to have been attained." This led Lindley to inquire more closely into the conditions under which orchids grew in their native countries, and which, if accurately ascertained, would, he believed, supply data for a more successful cultivation of them. The results of his inquiry and the inferences he drew from them are summarised in a paper which he read before the Society in May, 1830. It is evident from this paper that the information

* John Smith (primus), Curator of the Royal Gardens at Kew, in Gard. Chron. XXIII. (1885), p. 144.

he obtained was far too restricted, and held good only for a limited area; hence from such imperfect premises the conclusions could scarcely be otherwise than fallacious.

For example—The Society's collectors in Brazil informed him that "they *exclusively* occupy damp woods and rich valleys among vegetation of a most luxuriant description, by which they are embowered." The word "exclusively" was unfortunate, for we now know that most of the finest of the Brazilian Cattleyas and Lælias occur at considerable elevations and often in exposed situations. Dr. Wallich, to whom we owe the first introduction of many fine Indian Dendrobæs, told him that "In Nepal, the thicker the forest, the more shady the trees, the richer and blacker the natural soil, the more profuse are the orchids. There they flourish by the sides of dripping springs, in deep shady recesses in inconceivable quantity, and with an astonishing degree of luxuriance." Dr. Lindley then proceeds to say that high temperature and excessive humidity are essential to the well-being of these plants. The hottest countries if dry and the dampest if cool are destitute of them, while there is no instance of a country both hot and damp in which they do not swarm, citing in illustration of this, the Malay Archipelago, the estuaries of the Ganges and Irawaddy, Sierra Leone, Madagascar, and the West Indies. He omits, doubtless quite unintentionally, all mention of the higher slopes leading to the *Tierra fría* of Mexico, both on the Atlantic and Pacific slopes, and also the higher zone of the Andean Cordilleras from Venezuela to Upper Peru, the region of the Odontogloss, Masdevallias, Cattleyas, etc., where the climate is both *cool* and *damp*, a region which Humboldt and Bonpland had proclaimed to the world many years before to be rich in epiphytal orchids of the most remarkable forms and of the most exquisite colours. At the same time it should be borne in mind that Griffith had not yet ascended the Khasia Hills, nor Sir J. D. Hooker and Cathcart the Sikkim Himalayas, nor Parish and Benson the mountains of Moulmein and Lower Burmah; the so-called temperate orchids of the Eastern hemisphere were unknown to Dr. Lindley at the date of reading the paper we have quoted.

From the data thus adduced Lindley framed his cultural recommendations, the most essential conditions of which were deep shade and excessive humidity, to which he added good drainage that appears previously to have been generally neglected, but making no mention of ventilation. So predominant had Lindley's influence become in all matters pertaining to orchids, whether as the chief botanical authority on them, or from the position he held in the Society, that the unhealthy *régime* of cultural treatment approved by him

became, as it were, the only orthodox one and was generally persisted in, in all its essential points, for a long series of years, so that when Mr. Bateman, about the year 1837, formulated a course of treatment for tropical orchids in the introduction to his *Orchidaceæ of Mexico and Guatemala* it differed but little from Dr. Lindley's recommendations except an important direction to give the plants a season of rest by reducing the temperature in winter and to attend to the condition of the atmosphere of the house. It is, however, only just to the memory of Dr. Lindley to add that when later, as more correct information came to hand respecting the habitats of orchids and their environment *in situ* he never hesitated to give cultivators a friendly warning—thus in the *Botanical Register* for 1835 under tab. 1699 (*Oncidium ampliatum*) we find the following remarks:—

"It is well known that the most considerable part of the epiphytal ORCHIDÆ is found in the greatest vigour in damp sultry woods of tropical countries; and accordingly we endeavour in our artificial cultivation to form an atmosphere for them as nearly as possible that which they would naturally breathe in such stations. That this is attended with very great success is obvious from such plants as the one now figured (*Oncidium ampliatum*), and from the numerous splendid specimens which are from time to time appearing in the collections of Earl Fitzwilliam, Lord Grey of Groby, the Messrs. Harrison, Bateman, Huntley, Loddiges, Knight and the Horticultural Society.

"But it is sufficiently evident that although this kind of treatment is admirably suited to a considerable number, there are others which grow most unwillingly, or scarcely survive under such circumstances. For instance *Dendrobium speciosum* languishes in situations where the Stanhopeas are in their greatest splendour; and the Chinese Bletias almost perish by the side of Eulophia and Zygopetalum. This arises from the great difference in their respective constitutions, which are each adapted to distinct conditions of life, and our failure arises from our mistaking a general principle for a universal law. If a great majority of the epiphytal ORCHIDÆ swarm in damp tropical forests, there is a considerable minority which live in an entirely different climate. Thus in the genus *Oncidium*, *On. nubigenum* is only found on the cool mountains of Peru (Ecuador) at the height of 13—14,000 feet; it will therefore require a treatment altogether distinct from many others of the genus. *Dendrobium moniliforme* again occurs only in Japan as far north as 37° or 38° or the parallel of Lisbon and is periodically subject to a very low temperature."

And during his long editorship of the *Gardeners' Chronicle* Lindley

constantly published such items of information as came to hand that he believed would afford useful hints to cultivators.

The splendid specimens alluded to by Lindley were chiefly Brazilian Maxillarias, West Indian Epidendra, Catsetsa and Mormodes from the hot valleys of Guiana and Central America, Saccolabiums and Dendrobiums from the Indian jungle and the like; not the grand Cattleyas, elegant Odontoglosses and brilliant Masdevallias that form the most conspicuous ornaments of the collections of our time, for such of these as were then imported were doomed to certain destruction in the hot steamy, unventilated stoves to which they were consigned on their arrival in England, and to the temperature of which they were as great strangers as to our severest winter frosts. And thus perished within a few months most of the earliest introduced Cattleyas, Laelias, Odontoglosses and Oncids, but not without a protest from men who had seen them and other orchids growing in the temperate and cool alpine regions within the tropics. So early as 1835, Allen Cunningham reported to Dr. Lindley how different were the conditions under which Australian orchids grew in their native country from those to which they were subjected in the hot-houses of England, and that they should soon perish in them seemed to him but a very natural consequence.* Then followed Mr. G. Ure Skinner who gathered many orchids on the Cordilleras of Guatemala, Gibson who collected them on the Khasia Hills for the Duke of Devonshire, Gardner on the Organ Mountains, William Lobb on the Peruvian Andes, and Motley on the mountains of Java. These, one and all, gave monitory warnings against the folly of subjecting orchids which naturally grew in a temperate climate, to the stifling heat of an Indian jungle. In fact, it was high time such warnings should be given, for as private collections were being formed and multiplied and high prices were being paid for the choice kinds, epiphytal orchids were being poured into the country in a continually increasing stream, only too often to tantalise the purchasers with a transitory sight of their lovely flowers and curious forms, and then to languish and die. For more than half a century England was, as Sir Joseph Hooker once observed, "the grave of tropical orchids."

But a change of system was at length approaching, not brought about so much by the remonstrance of travellers like those just

* Bot. Reg. 1835, sub. t. 1699.

mentioned as by the intelligence and sagacity of a few practical gardeners on whom had been laid the responsibility of cultivating the costly collections of their employers. One of the first of these was Joseph Cooper, gardener to Earl Fitzwilliam at Wentworth, near Rotherham, Yorkshire. Dr. (afterwards Sir William) Hooker who visited the orchid house at Wentworth in 1835 was surprised at the degree of success with which the plants were cultivated there, and adds:—"I must confess that the sight of this collection, whether the vigorous growth and beauty of the foliage, or the number of splendid species blossoming at one time be considered, far exceeded my warmest anticipations." *Cooper's chief deviations from the established practice consisted in growing the orchids in a lower mean temperature and the admission of fresh air into the house.

Contemporary with Cooper and residing at a comparatively short distance from him was a far more eminent horticulturist and of whom it is not too much to say that through him was brought about in the course of time a greater improvement in orchid culture than was ever effected by any single man. This was Joseph Paxton, gardener to the Duke of Devonshire at Chatsworth. The Chatsworth collection began to be formed about the year 1833, and three years later it contained upwards of 300 species. In 1837 the Duke of Devonshire sent Gibson on a mission to the Khasia Hills which resulted in the addition of a large number of species from that region, many of them introduced for the first time into European gardens. The collection was also being constantly increased from various sources so that within ten years from its first formation it became the largest private collection in the country. With so large a range of subjects for observation and experiment and with the ample resources of Chatsworth at his command, Paxton gradually put into practice a more rational method of culture which eventually led to the cultural system now followed, although years elapsed before his example and teaching had any marked influence.

In 1834 Paxton commenced the publication of his *Magazine of Botany* which he continued to edit until December, 1849, when it was discontinued in the form in which he had founded it, but was followed for a short period by a similar serial edited by Dr. Lindley and called Paxton's *Flower Garden*, throughout which orchids occupy a prominent

* Bot. Mag. sub. t. 3395.

place. In the earlier volumes of the *Magazine* Paxton published various articles relating to the Chatsworth and other collections of orchids, and in them may be traced the steps by which he, in the first place, emancipated himself from the prevailing erroneous methods of treatment and afterwards gradually substituted more scientific and consequently more successful ones. Evidence of these were afforded to Dr. Lindley who visited Chatsworth in 1838 and who thus recorded his impressions:—"The success with which epiphytes are cultivated by Mr. Paxton is wonderful, and the climate in which this is effected, instead of being so hot and damp that the plants can only be seen with as much peril as if one had to visit them in an Indian jungle, is as mild and delightful as that of Madeira."* Then follows an account of the cultural treatment adopted at Chatsworth by Paxton of which the salient points need only be noted here; they were—separate houses or compartments of houses for orchids from different climates—a lower average temperature than was usually maintained by the cultivators of orchids at that time—a more efficient ventilation by which a larger volume of fresh air was admitted into the houses, especially during the growing season—the maintaining of a moist atmosphere by occasionally watering the paths and stages of the house—an improved method of potting with especial regard to efficient drainage and greater attention to root development.



Orchid baskets used by Loddiges about 1840.
(Copied from Paxton's *Magazine of Botany*.)

The example of Paxton and the frequent occurrence of failures in the collections under their charge were not lost upon many intelligent gardeners who had opportunities of becoming acquainted with Paxton or had access to his writings. Among the earliest of these was Donald Beaton, a man of remarkable industry and keen perception, and characterised by Sir William Hooker as "one of the ablest and most scientific gardeners of this country,"† and during

* Bot. Reg. XXIV. (1838) sub. t. 5 ex. Sertum Orchidaceum.

† Bot. Mag. sub. t. 3804.

the latter period of his life a regular contributor to the *Cottage Gardener* (now *Journal of Horticulture*). From the circumstances under which he was placed while gardener successively to Mr. Gordon at Haffield, Mr. Harris at Kilburn, and Sir William Middleton at Shrubland Park, the two last named being amateurs of orchids, more than perhaps from choice, he paid much attention to these plants, and from his various contributions to the botanical and horticultural publications of his time it is instructive to trace the changes he successively made in his modes of treatment, changes that were impressed upon him by the force of accurate observation and reflection; how at first he adopted the erroneous practices then prevalent respecting orchid culture, but which he stigmatised as "hideous," "frightful" when, after a few years' experience, he had become one of the best cultivators of orchids of his time.



Miltonia Clowesii on a block of wood at Messrs. Loddiges in 1842.
(Copied from Paxton's Magazine of Botany.)

In 1836, while in the service of Mr. Gordon, he contributed some notes on orchids to Paxton's *Magazine of Botany*,* from which we extract the

* Vol. II. p. 263.

following passages, which are quite characteristic of his style:—"I never did nor never could purchase any of these plants, consequently I only in the first instance received the smallest bit of most of my plants, and I have succeeded far beyond my expectations. The last two winters I removed my larger plants from my regular orchid-house for wintering, and kept my smallest plants in a regular heat of from 70 to 80 degrees (F.), and had a good crop of cucumbers to the bargain. I never water them overhead in the winter, but the house is kept moist." He does not inform us how long he kept his plants alive under that treatment, but *experiencia docet*, and no gardener was more apt to avail himself of the teachings of experience than Beaton, for five years later—when he was with Mr. Harris at Kilburn—we find him writing to Sir William Hooker on the treatment of some orchids that had been gathered in the high mountainous districts of Michoacan in Mexico by Galeotti, including *Laelia autumnalis*, *L. albida*, *L. glauca*, *Cattleya citrina*, *Oncidium leucochilum* and other well-known kinds, which he kept in a winter temperature of 40° to 45° F. (4° to 7° C.); he was thence one of the first who ventured to grow orchids in so low a temperature. He was apparently surprised at his own success, for he adds with remarkable foresight—"You will thus see how desirable it is for the extension of the cultivation of this family that we should procure all the species that are to be found in the higher altitudes in Mexico and other places, to enable amateurs of limited means to cultivate a few beautiful plants of ORCHIDÆ; for hitherto this fine tribe of plants has only been enjoyed by the wealthier classes."* From that time Beaton insisted upon more attention being paid than hitherto to the climatic conditions under which orchids grow, especially at high altitudes within the tropics, and the consequent necessity of adapting their cultural treatment accordingly.

About this time a pamphlet *On the Management of Orchidaceous Plants* was printed for private circulation by Mr. J. C. Lyons,† an amateur living at Ladiston, in Ireland. It contained a general essay on the cultivation of orchids and a calendar of operations, probably the first ever issued in a complete form. The cultural directions were mainly those followed by most growers at that period, but the author recommends a distinction being made between those orchids that grow naturally in shade in damp hot places, and those that grow in an elevated situation in a drier atmosphere and in direct sunlight. His chief deviation from the ordinary practice of his time was the admission of steam from

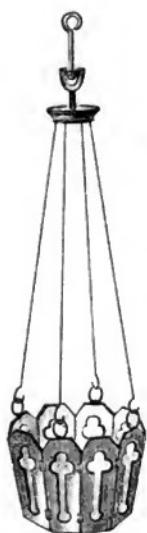
* Bot. Mag. sub. t. 3804 (1841).

† His name is preserved in *Schomburgkia Lyonsii*.

the boiler into the house every evening during summer, and by syringing the plants in imitation of a gentle shower "not driven against them with an upsetting force." His chief novelty was the use of slate baskets, the construction of which is shown in the accompanying woodcut copied from the *Gardeners' Chronicle*.

Contemporary with Beaton and prominent among the cultivators of orchids during the fifth decade of the century were Thomas Appleby, gardener to Mr. Brocklehurst, of The Fence, near Macclesfield; James Brewster, gardener to Mrs. Wray at Oakfield, Cheltenham; and a little later than these, George Gordon, Superintendent of the Horticultural Society's Garden at Chiswick; John Mylam, gardener to Mr. Sigismund

Rucker at West Hill, Wandsworth; and the late Mr. B. S. Williams, of Holloway, at that time gardener to Mr. Charles B. Warner, of The Woodlands, Hoddesdon. The results of their experience which they communicated from time to time to the horticultural press together with the fine specimens of cultural skill they exhibited at the Horticultural Society's Shows at Chiswick and other places had a marked influence on the orchid culture of that and the following decade (1850—60), and did much to hasten the end of the unhealthy *régime* that had so long held sway.



Orchid basket of slate used by Mr. J. C. Lyons.

Long, however, before this period a revolution had been slowly but surely effected, which had an enormous influence on the cultivation of plants under glass, and contributed in no small degree to the improvement in orchid culture that subsequently followed. This was the heating of glass-houses by means of hot-water pipes, which were first used for this purpose on a small scale by Mr. Anthony Bacon, of Aberaman in Glamorganshire, and afterwards by the same gentleman at Elcot, near Newbury. The inventor of the process is said to have been a Mr. Atkinson. The change from the system of heating by means of the brick flue with the tan bed to that of heating by hot water was nothing less than the substitution of an almost perfect control over the heating power with a great diminution of the labour of attending to the fires, for a very imperfect control with unremitting attention day and night; and added to this was

the admission of fresh warmed air in lieu of no ventilation at all, to say nothing of the smoke and noxious vapours that were constantly escaping through the cracks and fissures of the flues.

With better appliances and with a more copious record of experience gained by different cultivators, and especially with the aid of more accurate information respecting the habitats and climate in which the species naturally occur, the cultivation of epiphytal orchids could scarcely fail to make some progress, but the progress was slow and along certain lines only, so that looking back upon the state of orchid culture forty years ago and upon what we are now accustomed to see daily, one can scarcely suppress a feeling of astonishment that its history should present to us the phase it does. During the decade 1840—50 the existence of the beautiful *Laelias*, *Odontoglotis*, *Oncids* and other orchids inhabiting the highlands of Mexico and Guatemala had become well known from the discoveries of Skinner, Karwinsky, Galeotti and others; and the mission of Linden to Colombia in 1842—3 revealed to science and to horticulture the surprising wealth of *Cattleyas* and *Odontoglotis* inhabiting the Cordilleras of that region, the existence of which had been foreshadowed in the beginning of the century in the works of Humboldt and Bonpland. These plants which are now found to be among the easiest of orchids to cultivate were, during the period under review, brought to Europe in considerable numbers but only to perish under the barbarous treatment in the hot-houses to which they were consigned.

Nevertheless epiphytal orchids in increasing numbers continued to arrive both from the east and west. Communications to the horticultural press respecting them became more frequent and more copious, and courses of cultural treatment were formulated for them by well-known cultivators. One of the most elaborate of these was communicated by Gordon and published in the Journal of the Horticultural Society for 1849, and which may thence be assumed to be the method of culture approved by the Council of the Society at that epoch. The system advocated in that paper was undoubtedly in advance of its time and was, as Gordon himself admits, at variance in some points with the methods commonly followed. Some of the fundamental principles of orchid culture enunciated by Gordon were vitiated by assumptions that became

very prevalent at that time but were not then known to be fallacious; for instance—he held that the climates (temperatures) in which orchids grow naturally should be imitated as closely as possible in the glass-houses in which they were cultivated—thence leaving out of consideration other phenomena attendant on climate and on account of which it is impossible to imitate artificially, and in very many cases even approximately, the climate of a tropical region in the glass-houses of a country situated in so high a latitude as ours. He also accepted the common belief of that period and which was only dispelled after a long series of losses and disaster, that *the supply of fresh air required by orchids is but small*, and he accordingly recommended that the houses in which they were cultivated should be ventilated at the top only.

In 1851 appeared a series of articles in the *Gardeners' Chronicle* by Mr. B. S. Williams entitled "Orchids for the Million," adopting a popular phrase of the period but which was not destined to be realised in the sense intended by the author. These articles with some additions and alterations subsequently formed the first edition of *The Orchid Grower's Manual* which with the following editions obtained a large circulation and exercised a considerable influence on orchid culture for many years afterwards. The cultural details recommended by the author and put into practice by him at Hoddesdon approach more nearly the cultural routine followed at the present time than any course of treatment that had previously been formulated. They mark with tolerable distinctness the degree of progress attained in orchid culture at the epoch of publication and show the gradual transition that was being made towards the more successful methods of the present time. With the view of bringing this clearly before the reader we have put in a condensed form the fundamental principles of orchid culture enunciated by Mr. Williams in 1851. From the papers we are quoting it is clear that the author shared in the prevalent belief that the temperatures (climates as they were then called) in which orchids grew naturally should be imitated in practice, the possibility of imitating those climates in all their bearings not having been then realised, and he accordingly gives somewhat higher temperatures than those now generally maintained. To the following directions, however, few exceptions can be taken by cultivators.

Orchids must have a period of rest in a dry and comparatively cool atmosphere, and during growth a high temperature and moist atmosphere should be maintained.

A moist atmosphere may be maintained by "damping down," that is to say, by sprinkling water over the stages, walls, and paths of the houses.

Water should be applied according to the season of the year, withheld in winter, given copiously during active growth, a gradual increase in quantity after growth commences and a gradual decrease when the season's growth approaches completion.

Pots according to the size of the plants should be used with an ample drainage of broken crocks and charcoal. The compost should consist of fibrous peat and sphagnum moss.

For Aërides, Vandas, Phalaenopsis, Saccolabiums and other Indian orchids, and also Angræcums, blocks of the wood of the apple, pear, plum or even of cork if obtainable are best; or baskets made of hazel or maple wood.

Hot-water pipes should be used for heating the houses. Fresh air should be admitted by ventilators near the ground close to the hot-water pipes, and egress allowed by ventilators at the top.

The plants should have as much light as possible. Shading should be used on hot bright days and at such times as when there is risk of injury to the foliage.

And yet so deeply rooted was the notion that all orchids *must* be cultivated in a hot and damp atmosphere that the admonitions and teachings of the orchid growers we have named seem to have had but little effect generally. Cattleyas, Odontoglosses and other orchids from the temperate region of the Central and South American Cordilleras were in most collections placed in the East Indian house, to the heat and close atmosphere of which they soon succumbed. To such an extent were the losses felt that Lindley in a remarkable article published in the *Gardeners' Chronicle* towards the end of 1859 pronounced their treatment "a deplorable failure," and which Mr. Bateman a few years later characterised as "incredible folly."* But the spell which had held orchid culture in thrall for more than thirty years was at length broken; the wisdom of the advice vainly tendered so long ago by Paxton, Beaton and others began to be recognised and put into practice. Separate houses or compartments of houses better constructed and better ventilated, in which warm, intermediate, and

* Monograph of *Odontoglossum*, Intr. p. 1.

cool temperatures were maintained, were in use for most orchid collections at the beginning of the seventh decade. With the simultaneous dispatch of Weir by the Royal Horticultural Society, of Blunt by Messrs. Low and Co. of Clapton, and of Schlim by M. Linden of Brussels, was inaugurated a new era in orchid culture.

We have now arrived at an epoch within the memory of most living cultivators and which may not be inaptly regarded as the commencement of the period of modern orchid culture. In the body of this work we have given the routine of cultural treatment mainly adopted by the most successful cultivators of the present time. With improved means and appliances and with a more accurate knowledge of the physical conditions under which they grow in their native country, the cultivation of very many of the finest epiphytal orchids from the tropical regions of both the Old and the New World has become as assured as that of the most ordinary stove and greenhouse plants. Added to this the greatly increased facilities of importation, combined with more rapid transport, have resulted in bringing them within the reach of a much larger circle of amateurs.

Still much remains to be accomplished, but past achievements should encourage future efforts, and there is surely no reason to despair; let us rather keep in view the defects that remain and try to discover a remedy for them. To cite instances:—Not many can yet boast of growing successfully for half-a-dozen consecutive years such orchids as *Cattleya citrina*, *Laelia albida*, *L. majalis*, *L. furfuracea*, *L. autumnalis*, *Epidendrum vitellinum*, *E. nemorale* and others from the Mexican highlands. The great genus *Oncidium* is known to include more than three hundred species, of which number more than one-half have at one time or another been introduced into European gardens, but scarcely one-sixth of these have yet proved amenable to the most assiduous care that has been bestowed upon them. *Oncidium Jonesianum*, one of the most admired of the genus and eagerly sought after by all amateurs, was imported for the first time in considerable numbers in 1878, but in less than five years afterwards scarcely a single plant remained alive in Europe. The fasciculate Dendrobes afford another instance of a group of orchids that often prove provokingly disappointing to the cultivator; of the

included species, *Dendrobium Bensoniae*, *D. Wardianum*, *D. crassinode*, *D. Devonianum*, *D. lituiflorum*, *D. MacCarthiae* and many others are notoriously short-lived in the orchid houses of Europe. Several fine Dendrobes of the *Formosae* (nigro-hirsute) group even when imported in large masses gradually decline after their first flowering till they die outright. The Australian Dendrobes too, a most curious and interesting group, have never, with two or three exceptions, been successfully cultivated; but the climate of Australia with all its attendant phenomena is now as well known as that of Wales or Cornwall, and the conditions under which the plants grow are clearly understood; better results than hitherto should thence be looked for. A few more instances must not be passed over—a lovely section of Epidendra, known in gardens as Barkerias, have thus far baffled the efforts of the most experienced cultivators; the noble group of Zygotepetala belonging to the sections HUNTLEYA, BOLLEA and WARSCEWICZELLA refuse to thrive in our houses; and lastly such remarkable orchids as *Chysis bractescens*, *Cattleya superba*, *Colax jugosus*, *Grammangis Ellisii*, *Diacrium bicornutum* and others that could be named are still regarded as difficult plants to cultivate, in which category must also be included that wonderful series of orchids with unisexual flowers referred to Catasetum and Cycnoches, and the scarcely less strange but closely allied genus *Mormodes*.

There is thence a wide field still open for the exercise of cultural skill, and a long list of species remain to be rendered tractable to cultivation. It is, however, satisfactory to note that much is being accomplished in the desired direction and that the records in the horticultural press of the successful treatment of plants hitherto refractory, are becoming more frequent from year to year.

ORCHID AMATEURS OF THE PAST.

Our retrospect of orchid culture would be imperfect without some notice of the most prominent amateurs of orchids who formed collections chiefly between 1825 and 1850, for prior to the first-named date epiphytal orchids were regarded as little else than curiosities for Botanic Gardens and beyond the sphere of the cultivator of ordinary plants. We introduce this notice with the object of preserving from oblivion the honourable mention made of disinterested but withal enthusiastic ladies and gentlemen in contemporary botanical and horticultural publications which are now but rarely consulted except by botanists, for through them a large number of beautiful plants were brought for the first time within the cognisance of science and horticulture, and which contributed more than any cause that we know of to promote orchid culture in this country.

One of the earliest and most eminent of these was Mr. William Cattley, of Barnet, to whom the noble genus *Cattleya* is dedicated. He was not only a cultivator but an introducer of exotic plants, and through his correspondents abroad he was enabled to enrich the stoves and greenhouses of this country with several beautiful species previously unknown. At his death in 1832 his collection passed into the hands of Mr. Knight, of Chelsea. Contemporary with Mr. Cattley and surviving him were Mrs. Arnold Harrison and Mr. Richard Harrison, of Liverpool, whose collections of orchids, consisted chiefly of South American species which were sent to them by their brother Mr. William Harrison, a merchant residing at Rio de Janeiro, through whom many fine Brazilian orchids were received for the first time in England. The name of the lady is kept in remembrance by *Bifrenaria Harrisoniae*, and that of Mr. W. Harrison by *Oncidium Harrisonianum*. Mr. Bateman states that Mr. Richard Harrison was the first to commence the practice of growing "specimens," and his residence at Aigburth became a sort of Mecca to which the faithful orchid grower made his annual pilgrimage.* His collection was dispersed in 1842.

We may here mention two other ladies of Liverpool who "taking

* *Orch. Mex. et Guat. Introduction.*

advantage of the commercial facilities of the town and by its intercourse with the New World have introduced from thence its most beautiful productions."* One was Mrs. Moss, of Otterspool, whose name is commemorated in the popular *Cattleya Mossiae*. The other was Mrs. Horsfall, after whom was named the beautiful *Ipomoea Horsfalliae* by Sir William Hooker.

During the period 1830—40 was formed the celebrated collection of Earl Fitzwilliam at Wentworth Woodhouse, near Rotherham, already referred to.† The genus *Miltonia* commemorates the great services rendered to Natural History by that nobleman. Also the still more celebrated one at Chatsworth, for many years superintended by Mr. (afterwards Sir Joseph) Paxton. *Cymbidium Devonianum*, *Dendrobium Devonianum*, *Galeandra Devoniana* will carry the memory of the Duke of Devonshire who formed it, far into the future. On a more modest scale than these was that of the Rev. J. T. Huntley in Huntingdonshire, whose name is preserved in the section *HUNTLEYA* of *Zygopetalum*. One of the motives for taking up the cultivation of orchids was peculiarly his own and is thus expressed by Mr. Bateman—"he liked the plants because those fiends, the hybridisers, could not touch them."‡

In friendly correspondence with Mr. Huntley and, in fact, with most orchid cultivators of note of that period was Mr. Bateman himself, the most accomplished amateur of his time, the patriarch of "Orchid Worthies" and still providentially with us, but who has long since given up the cultivation of his favourites. It was his intention to have written a short sketch of his career as a cultivator of orchids for this work, but the infirmities of age have rendered its fulfilment impossible; the loss of his personal narrative will be deplored by every lover of orchids, whilst the cause of it cannot fail to awaken the warmest sympathy. In a letter to Mr. Veitch, dated Friday (March 9th, 1894), he writes:—

"I gladly undertook to send you some of my *acta* as an orchid grower, but alas, I find it cannot be done. A year ago I found myself compelled to give up writing for a Protestant newspaper on account of pains in the head caused thereby, and I now find a similar

* Bot. Mag. sub. 3669 (1839).

† See p. 118.

‡ Orchid Conference, Journ. of Royal Hort. Soc. p. 49. It is needless to conjecture what his views would have been had he been spared so long as his friend Mr. Bateman.

obstruction when I attempt to write for you. I thought it would have been a much easier task, but I am painfully deceived, for although I tried every day to squeeze something out of my brain nothing came except the little MS. sent herewith."

We insert the contents of the little MS. with feelings of unfeigned respect; to this short narrative there must ever be attached an exceptional interest as the latest production of the venerable amateur who has watched the progress of orchid culture through the greater part of the century.

Early Struggles.—"I was devoted to orchids long before I knew what an orchid was, indeed, the word itself was quite strange to me when I heard my mother apply it to a beautiful plant with spotted leaves and speckled flowers which I had gathered in a country lane and regarded with great admiration. 'That,' she said, 'is an orchis' (*O. mascula*). I must have been then about eight years old, but I was more than eighteen when, the scene being shifted to Oxford, I stepped into a nursery situated where Keble College now stands and kept by the veteran Fairbairn, who had been gardener to Prince Leopold and Sir Joseph Banks.* This sealed my fate! Presently Mr. Fairbairn drew my attention to a curious plant with a few leathery leaves and several stout roots feeling their way amongst a number of small pieces of wood to which it was expected they would become permanently attached. 'Here,' he said, 'is a piece of the famous Chinese air-plant (*Renanthera coccinea*) which flowered under my care when gardener to H.R.H. Prince Leopold, at Bushey Park; would you like to see a drawing of it?' 'As you please.' It was certainly a vision of beauty that Mr. Fairbairn, opening a volume of the *Botanical Magazine*, t. 2997—2998, shewed me, for here was a perfect portrait of the Chinese air-plant, full size and correctly coloured. Of course I fell in love at first sight, and as Mr. F. only asked a guinea for his plant (high prices were not yet in vogue), it soon changed hands and travelled with me to Knypersley when the Christmas holidays began. I had caught my orchid, but how to treat it I knew not."

This was the beginning of the collection afterwards formed by Mr. Bateman at Knypersley Hall, in Cheshire, which he enriched by sending a collector at his own expense to Demerara in 1833, but although the mission fell short of expectation, the success was sufficient to encourage others to embark in similar adventures. He was soon afterwards more than compensated for the disappointment by Mr. George Ure Skinner, a merchant trading with Guatemala, at

* See p. 112.

that time an unworked mine in Natural History, and where there was believed to be a rich store of orchids. Having heard of Mr. Skinner through the specimens of birds and insects which he presented to the Natural History Museum at Manchester, Mr. Bateman wrote to him in March, 1834, and explained by means of sketches of some orchids what kind of plants he wished to see introduced from that country into England. Mr. Skinner responded to the appeal in a manner that far exceeded the expectation of the writer, and in less than ten years all the finest orchids of Guatemala were in cultivation in British gardens, most of which flowered for the first time in Mr. Bateman's stove at Knypersley. The many new and beautiful orchids thus brought to light, together with the energy displayed by that gentleman both in practice and by his publications to promote orchid culture, secured for him a very prominent position among the orchid authorities of this country. So early as 1837 Sir William Hooker dedicated to him the volume of the *Botanical Magazine* for that year which Mr. Bateman fancifully designated the *ANNUS MIRABILIS* of Orchidology.

It was in 1837 that Gibson brought to Chatsworth the rich collection he gathered on the Khasia Hills. In that same year Mr. Skinner sent to England the finest of the Guatemalan orchids; Cuming sent home his first consignment from the Philippine Islands including the first *Phalaenopsis* received alive in England, a single plant of *P. Aphrodite*. The brothers Schomburgk made their first contribution from British Guiana; and lastly a Frenchman named Deschamps brought from Vera Cruz a large consignment of Mexican orchids, nearly the whole of which was disposed of in England. Probably not less than 300 species were seen in England for the first time in that memorable year. The Orchidomania which had been rapidly spreading became greatly intensified by such an unusual addition of new forms. "From that time houses for their accommodation were raised in every direction; pots for their exclusive use were sold in the shops of London; their blossoms were imitated by the most fashionable manufacturers of artificial flowers; and the most munificent prizes were offered by horticultural societies for the finest specimens."*

Probably no one contributed more to bring about this great change in the aspect of orchid culture than Mr. George Ure Skinner, pre-eminently one of the "Orchid Worthies" of England, by whose untiring energy and disinterestedness the most beautiful orchids

* Batem. Orch. Mex. et Guat. Introduction.

of Central America became denizens for the first time of the glass-houses of Great Britain. The following particulars extracted chiefly from an address delivered before the Royal Horticultural Society in February 1867, by Mr. Bateman, will be read with interest:—

"From the moment he received the letter (*supra*) he laboured incessantly to drag from their hiding places the forest treasures of Guatemala and transfer them to the shores of his native land. In pursuit of this object there was scarcely a sacrifice he did not make, or a danger or hardship he did not brave. In sickness or in health, amid the calls of business or the perils of war, whether detained in quarantine on the shores of the Atlantic, or shipwrecked on the rocks of the Pacific, he never suffered an opportunity to escape him of adding to the long array of his botanical discoveries."

"Never shall I forget my delight," says Mr. Bateman, "on opening the first box of orchids he sent me, all carefully packed and in the best possible condition. Though gathered at random every plant was new. Masses of *Epidendrum Skinneri* (the first to flower and thence named after him) divers other Epidendra, *Oncidium Cavendishianum*, *On. leucochilum*, and *Odontoglossum bictonense*, the first Odontoglot that ever reached England alive."

His subsequent discoveries and introductions are noted in their respective places in the Synopsis of Genera and Species that follow; it is sufficient to mention here *Cattleya Skinneri* and *Lycaste Skinneri* which alone will keep his name in memory so long as orchids continue to be cultivated. And among his other discoveries, *Schomburgkia Tibicinis*, *Epidendrum cneidiophorum*, *E. Stamfordianum* and *Odontoglossum grande* have an exceptional botanical interest in addition to their great horticultural merit.

Mr. Skinner also made many valuable contributions to ornithology, and the collections of birds in this country were enriched by him with many rare and beautiful specimens, including several species of humming birds.

After the dispersion of Mr. Bateman's collection, Mr. Skinner greatly assisted the Polish collector Von Warscewicz, who brought to Europe many beautiful orchids previously unknown,* for such was his enthusiasm for orchids that either personally or through his agents he continued to search for new species to the end of his life. His later collections were entrusted to his friend, the late James Veitch of Chelsea. He died at Aspinwall, on the isthmus of Panama, January 9th, 1867.

While Mr. Bateman was cultivating orchids at Kuypersley, two

* Warscewicz's most interesting discoveries were made in 1848—9, during a very difficult and dangerous journey on foot with Indians along the mountain route from Chiapas in Mexico to Panama.

other collections in that part of England obtained considerable celebrity among orchid amateurs. One belonged to the Rev. John Clowes at Broughton Hall, Manchester; the house in which his collection was cultivated was of somewhat novel construction, the most prominent feature of it being a raised central gallery from which the plants placed on the shelves of a sloping stage on each side could be viewed from above.* His collection was left by will to the Royal Gardens at Kew, whither it was removed on the death of Mr. Clowes in 1846. The fine *Anguloa* from South America worthily commemorates his name. The second collection was that of Mr. Thomas Brocklehurst at The Fence, near Macclesfield, mentioned in the previous article;† his name is kept in memory by the type



Orchid baskets used by the Rev. John Clowes,
(Copied from Paxton's *Magazine of Botany*.)

species of *Houleitia*. Contemporary with these was another collection that had been formed by Sir Charles Lemon, at Carclew in Cornwall, and which appears to have been an extensive one for that period. Several fine orchids were communicated from it to Dr. Lindley for figuring and description in the *Botanical Register*.

Far superior to these collections in the number of species and varieties cultivated and in the length of time it was maintained in efficiency was that of another distinguished "Orchid Worthy," Mr. Sigismund Rucker at West Hill, Wandsworth, which had its commencement towards the end of the fourth decade and which was not finally dispersed till the death of that gentleman in 1875. The

* A plan of this house is given by Mr. Bateman in the Introduction to the *Orchidaceae of Mexico and Guatemala*.

† See p. 122.

house in which Mr. Rucker's orchids were first cultivated seems to have been better constructed than the orchid houses generally of that period, being more roomy and susceptible of better ventilation;* a circumstance which doubtless contributed much to the great success attained by Mr. Rucker in that early period of orchid culture, and whose specimens when exhibited rarely failed to secure the highest



Vanda Roxburghii as cultivated by Mr. Sigismund Rucker in 1840.
(Copied from Paxton's Magazine of Botany.)

awards at the various horticultural exhibitions in and around London. *Anguloa Ruckeri*, *Dendrobium Ruckeri* and other species were dedicated to him.

At the time Mr. Rucker began to cultivate orchids Mr. George Barker, of Springfield, near Birmingham, possessed one of the best

* A plan of Mr. Rucker's first orchid house is given in the Introduction to Mr. Bateman's *Orchidaceæ of Mexico and Guatemala*.

collections of them in the Midlands which he greatly enriched by sending Ross, one of his gardeners, on a special mission to Mexico to collect the best orchids of that country. Ross started on his mission in 1837, the *annus mirabilis* of orchidology, but his collection did not reach England till the following year. It included the beautiful *Odontoglossum Rossii*,* *Acineta Barkeri* and many others noted in their respective places in the following pages. Mr. Barker subsequently



Lycaste Skinneri in Mrs. Wray's collection at Oakfield, Cheltenham, in 1845.
(Copied from Paxton's Magazine of Botany.)

joined with Mr. Rucker, the Rev. John Clowes and a few others in contributing to the expenses of Linden's mission to Colombia in 1842—3. His name is commemorated by Lindley's genus *Barkeria*, now made sectional under *Epidendrum*. After his death in 1845 his collection passed into the hands of Mr. Blandy, of Reading. During Ross' mission to Mexico and for a short time after his

* This is probably the *Odontoglossum apterum* of the Mexican botanists La Llave and Lexarza.

return many species of the ORCHIDÆ and CACTÆ of Mexico were sent to the collections of the Duke of Bedford at Woburn Abbey and Mr. Harris, of Kingsbury, by Her Majesty's Consul-General, Mr. John Parkinson.

Before the fifth decade of the century was far advanced two lady amateurs had acquired a high reputation in the horticultural world an account of their extensive collections of exotic plants, especially of orchids which were regarded at the time as among the best cultivated in the country. These were Mrs. Wray, of Oakfield, Cheltenham, to whom Sir William Hooker dedicated the 67th volume of the *Botanical Magazine* (1841), and Mrs. Lawrence, of Ealing Park, to whom he dedicated the volume of the following year. In one of the earliest numbers of the *Gardeners' Chronicle** a description with figures is given of the orchid house at Ealing Park, of which Dr. Lindley observed that it was precisely that which theory would have suggested for such a purpose. Like that of Mr. Rucker's at Wandsworth, it seems to have been an improvement on the houses generally used for orchid culture at that epoch, and in it were grown the many fine specimens that afterwards obtained the highest awards at the shows of the Horticultural Society at Chiswick, and of the Royal Botanic Society at Regent's Park. The influence of Mrs. Lawrence in promoting horticulture was, however, far more reaching in its effects after her death than during her lifetime, for her love of plants was inherited in a still higher degree by her son, Sir Trevor Lawrence, Bart., the respected President of the Royal Horticultural Society.

In friendly competition with these and other amateurs of that time at the shows of the Horticultural Society at Chiswick and the Royal Botanic Society at Regent's Park was Mr. Charles B. Warner, of Hoddesdon, who exhibited many fine specimens of cultural skill in orchids from his collection, which was under the charge of the late B. S. Williams. In the enumeration of the species cultivated at Hoddesdon† we miss the grand Cattleyas of the *labiata* group, the finest of the Odontoglosses from the Cordilleras of Colombia and Peru, and the brilliant Masdevallias from the same region; but

* No. 3, vol. I. p. 36 (1841), and reproduced in vol. IX. ser. 3 (1891), p. 8.

† Gard. Chron. 1851, *passim*.

the last-named genus was scarcely known to horticulturists at that time; we find, however, Stanhopeas, Coryanthes and Cycnoches well represented, an evidence of these interesting genera being appreciated by the amateurs of orchids of that period. Among other collections formed at this period, and which afterwards acquired a high reputation for their extent and the success with which they were cultivated, should be mentioned that of Mr. Robert Hanbury at Stamford Hill, subsequently removed to The Poles, near Ware; and that of Mr. J. D. Llewelyn at Penllergare, Swansea, the latter still maintained in a high state of efficiency by his son, Sir J. T. D. Llewelyn, Bart.

Mr. Rucker's collection of orchids at West Hill, Wandsworth, has been mentioned above as having been maintained in efficiency for the long series of upwards of forty years, a somewhat rare fact in the early history of orchid culture. During that long period the successive improvements introduced were adopted till the modern methods of cultural treatment became fully applied. This collection thence historically connects the present state of orchid culture with that of the past. While the West Hill collection was still in its infancy another was being formed by one of the worthiest of the "Orchid Worthies," and which was maintained for as long a period and in like manner passed through the various phases of orchid culture described in the preceding pages. The collection we allude to was that of the late Mr. John Day at Tottenham, and with a short notice of this and the owner we may appropriately conclude our retrospect.

In Mr. John Day orchidology had one of its most ardent votaries, for although he had among his earlier contemporaries Mrs. Wray of Cheltenham, Mrs. Lawrence of Ealing, and Mr. Rucker of Wandsworth and other familiar names, he soon acquired a distinguished position among the amateurs of that period, all of whom he long survived and at length remained well nigh the sole connecting link between the older pioneers in orchid culture and the amateur growers of the present time. Mr. Day first acquired a love of orchids from occasional visits to the nurseries of Messrs. Loddiges at Hackney, from whom he purchased the first batch of plants that formed the nucleus of his collection at Tottenham. From that time he followed up his favourite pursuit with all the ardour of an enthusiast, constantly acquiring novelties till his collection became one of the

richest and most famous in Europe. In this collection many of the most admired orchids flowered for the first time in this country and among them were *Odontoglossum crispum*, *Aërides crassifolium*, *Angræcum Ellisii*, *Cattleya Walkeriana*, *Laelia elegans Wolstenholmiae*, named after Mr. Day's sister, *Cypripedium Stonei* and its wonderful variety *platyptanum*, of which he acquired the only plant that has ever been imported. Mr. Day's love of orchids led him to travel to their native homes with the object of better understanding their habits and environment *in situ*; the districts selected for this purpose were northern and southern India, Ceylon, Jamaica and Brazil, all of which with the exception of the first named he visited within the last ten years of his life; in fact, no amateur of his time possessed a greater practical knowledge of orchids than Mr. Day, whose name will be perpetuated into the far future by *Cælogyne Dayana*, *Cypripedium Dayanum*, *Laelia pumila Dayana*, *Cryptophoranthus Dayanus* and others.

SOME RESULTS OF THE HYBRIDISATION OF ORCHIDS.

The most striking development in the orchid culture of the present time is seen in the raising of hybrids and *métis* or mixed forms not immediately derived from two recognised species. To such an extent is muling being carried on, not only in the establishments of professional growers but also in the collections of amateurs, that among Cypripedes, at least, the progenies so obtained have become as varied in colour and form as those of many of our most familiar florists' flowers. In *Cattleya*, *Laelia*, *Calanthe*, *Dendrobium*, *Masdevallia* and *Phaius* hybrid forms are now very numerous; in other less popular genera the progress of muling has been much slower, so that in none of them does the number of hybrids raised artificially at present (1894) exceed half-a-dozen, while in some of them it is restricted to one or two. Nevertheless scarcely a year passes without a new genus being added to the list of those in which hybrids

have been obtained, and not only so but even bigeneric hybrids or hybrids between species of different genera are on the increase.

The hybridisation of orchids in its scientific aspect has been already touched upon.* Its history and progress may now be traced and some of the most important results enumerated.

One of the first, probably *the* first to attempt to raise orchids from seed produced by the cross fertilisation of different species was Dean Herbert, who has obtained an enduring name in science for his masterly systematic arrangement of the AMARYLLIDÆ, and in horticulture for having been the first to raise hybrid Narcissi and other hybrids in the genera included in the family of plants he so long and so assiduously studied. In a paper "On Hybridisation among Vegetables" published in the Journal of the Horticultural Society of London for 1847† occurs the following remarkable passage:—

"Cross-breeding among orchidaceous plants would perhaps lead to very startling results; but unfortunately they are not easily raised from seed. I have however raised *Bletia*, *Cattleya*, *Herminium monorchis* and *Ophrys aranifera* from seed; and if I were not during the greater part of the year absent from the place where my plants are deposited I think I could succeed in obtaining crosses in that Order. I had well-formed pods last spring of *Orchis* by pollen of *Ophrys* as well as of other species of *Orchis* which had been forced; and if I had remained on the spot I think I should have obtained some cross-bred orchidaceous seed. An intelligent gardener may do much for science by attempts of this kind if he keeps accurate notes of what he attempts and does not jump at immature conclusions."

Two years later an article "On Growing Orchids from Seeds" was contributed to the *Gardeners' Chronicle* by the late Dr. Moore, Curator of the Royal Botanic Garden at Glasnevin.‡ In this article he states that within the five years previous to its publication, seedlings of the following species were raised in the orchid house at Glasnevin, namely, *Epidendrum elongatum*, *E. crassifolium*, *Cattleya Forbesii* and *Phaius (Thunia) albus*, the seeds of which all vegetated freely. He gives no information respecting the fertilisation of the plants from which these orchids were raised, but it may be inferred from the tenor of the article that they were not hybrids but had been

* See page 89.

† Vol. II. p. 104.

‡ Gard. Chron. 1849, p. 549.

obtained from flowers fertilised with their own or with the pollen of other flowers of the same species.* Dr. Moore especially dwelt on the difficulty in preserving the young seedlings alive during the first year of their existence.

A little later, Robert Gallier, Gardener to Mr. Tildesley at West Bromwich in Staffordshire, communicated to the *Gardeners' Chronicle* an account of his attempt to raise orchids from seed.† In this communication he states that he crossed *Dendrobium nobile* with *D. chrysanthum* which produced a pod of seeds; he sowed these in three ways (on three different substrata), but only obtained five plants, and these he succeeded in keeping alive only for a few weeks. This is the earliest recorded instance we find of hybridisation among orchids being effected by a *bonâ fide* gardener; the evidence is, however, entirely his own and moreover the cross was an isolated one with very imperfect results, nor does it seem to have been followed by any further trial or experiment by the same operator.

At that period (1850—60) there was a prevalent notion among horticulturists that muling among orchids was an impossibility. To Dean Herbert and Dr. Moore, who were well acquainted with the structure of orchid flowers, their fertilisation by hand presented no difficulty; to horticulturists and gardeners it was quite different. Not only had they, in common with many others, not the slightest suspicion of the fertilisation of orchids by insect agency, but, moreover, very few of them possessed even an elementary knowledge of botany. They could, it is true, distinguish accurately the stamens and pistils of many flowers familiar to them, and they were aware of the functions of those organs, but the confluence of those organs into the solid column of an orchid flower was to them a profound mystery. It was unfortunate too that Dean Herbert's injunction to keep accurate notes of what was attempted was not followed in the early days of orchid hybridisation, whence the uncertainty that still hangs over the parentage of some of the earlier acquisitions.

Gallier's futile attempt detracts nothing from the credit due to Dominy as the first successful hybridiser of orchids who took up the

* Gard. Chron. 1849, p. 661.

† Dr. Lindley in Gard. Chron. 1858, p. 4, states that *Prescottia plantaginea*, a terrestrial orchid related to our native *Spiranthes* and *Neottia*, was raised abundantly from seed in 1822 in the garden of the Horticultural Society at Chiswick.

subject in our Exeter nursery about the year 1853. The possibility of muling orchids was suggested to him by Mr. John Harris, a surgeon of Exeter, who pointed out to him the reproductive organs seated in the column, and showed that the application of the pollinia to the stigmatic surface was analogous to the dusting of the stigma of other flowers with pollen.

This simple fact being once fairly grasped, the work of hybridisation proceeded apace, and from that time to the present experiments have been carried on uninterruptedly in our horticultural establishments. The flowers of showy species of *Cattleya*, *Laelia*, *Calanthe*, etc., were fertilised with the pollinia of other species, and even the flowers of supposed different but of course allied genera were also operated upon in the same way. Capsules were produced in abundance which in due course proved their maturity by dehiscing and thus the desired seed was at hand. Then arose a great difficulty, a difficulty which still exists, namely, to discover the most suitable method of raising seedlings. The seeds of orchids are minute chaffy bodies of extreme lightness; so minute are they that an ordinary pocket lens is powerless to enable one to know whether the seeds are likely to contain a germ or are mere lifeless dust. When growing wild it is evident that the contents of the mature capsules after dehiscence are more or less scattered by the wind, perhaps wafted to great distances until they settle on the branches of trees, on shelving rocks or other suitable substrata where the seeds can germinate and the seedlings firmly affix themselves. Following or at least believing that we were following Nature, so far as the altered circumstances of artificial cultivation allowed, every method or available means that could be thought of was brought into request to secure the germination of the seed. It was sown upon blocks of wood, pieces of tree-fern stems, strips of cork, upon the moss that surfaced the pots of the growing plants, in fact, in any situation which seemed to promise favourable results. Among the most cogent causes of failure in the raising of seedling orchids there can be no doubt that the greatest are the altered conditions of climate, especially the deficiency of sunlight, and the artificial treatment to which the plants are necessarily subject in the glass-houses of Europe. The capsules neither can nor do attain the perfection natural to them in their native countries, and it is more than probable that, independently of the capsules

grown in our houses being the production of cross-breeding, they do not yield a fractional part of the quantity of good seed they would do in their native land; and so with their progeny—the tender seedlings are brought into growth under circumstances so different from what they would have been in the native home of the parent plants, that it is not at all surprising that multitudes of them perish in their earliest infancy. The capsules are not only less perfect in our houses than they would be in a state of nature, but they also require a longer time to arrive at maturity, a circumstance that must tell against the progeny.*

Such are some of the difficulties the raisers of orchids from seed have to contend against; we will here enumerate the most remarkable results only, as all or nearly all the hybrids known to be in cultivation up to the date of publication of the different parts of this work are described in their respective places. We commence with those raised in our own houses.

Dominy began to hybridise orchids at our Exeter nursery in 1853, and continued his operations for some time after removing to Chelsea in 1864. Seden began at Chelsea in 1866, and has worked uninterruptedly from that time to the present. Our experience therefore extends over a period of forty years, during which the field of operations has been greatly enlarged, especially of late years, our experiments being made upon many hundreds of crosses, not only between allied species but also between species of different genera.

Among the results obtained by Dominy at Exeter *Calanthe Domini* raised from *C. Masuca* and *C. furcata*,† the last named being the pollen parent, will always be regarded with interest as being the first hybrid orchid raised by hand that flowered. It flowered for the first time in October, 1856, on which occasion the inflorescence was shown by the late Mr. James Veitch to Dr. Lindley, who exclaimed on seeing it, "You will drive the botanists mad," an expression quite characteristic of the rigid systematists who lived prior to the publication of Darwin's *Fertilisation of Orchids*, and to

* H. J. Veitch on the Hybridisation of Orchids read at the Orchid Conference at South Kensington in May, 1885, and published in the Journal of the Royal Horticultural Society.

† A white-flowered species somewhat resembling *Calanthe veratrifolia*, a native of the Philippines and Java. It was introduced from the first-named locality by Cuming about the year 1840, but it has long since disappeared from cultivation.

whom, as Mr. Bateman has oft repeated, all hybrid productions were an abomination. The first hybrid Cattleya that flowered was named *C. hybrida*, a plant now lost, but which was soon followed by the flowering of *C. × Brabantia*. The first hybrid Cypripedium to flower was *C. × Harrisianum*, which justly commemorates the name of Mr. Harris who first pointed out to Dominy the feasibility of mauling orchids. Among other noteworthy acquisitions raised at Exeter were *Laelia × exoniensis*, Dominy's *chef d'œuvre* from a cultivator's point of view, and *Calanthe × Veitchii*, long since recognised as one of the handsomest and most useful winter-flowering orchids, and in recent times a potent agent in the parentage of many new and beautiful Calanthes that have been raised artificially. Mention must also be made of *Cattleya × Dominiana*, *Laelia × Pilcheriana*, a true Laelia, and *Phaiocalanthe irrorata*, a generic hybrid which has a special interest of its own in its scientific bearing and in its being the forerunner of similar crosses by Seden and others already noticed.* Among Dominy's later acquisitions which flowered for the first time at Chelsea is *Cypripedium × Dominianum*, the first hybrid Selenipedium ever raised; the very distinct *C. × vexillarium*, the forerunner of a group of handsome Cypripedes in which the rare and beautiful *C. Fairieanum* has participated in the parentage, *Laelia × calloglossa* and *L. × Veitchiana*. For fifteen years, as the editor of the *Orchid Review* justly observes, his record was unbroken, but at length others attracted by his success entered the field. Before recording the acquisitions of operators not connected with the Veitchian establishment we will pass in review the most important additions to the list of hybrids made by Seden, Dominy's successor.

The first that flowered was *Cypripedium Sedenii*. This was a remarkable cross in many respects; it was in fact raised from two crosses, *C. Schlimii × C. longifolium* and the same two *vice versa*. It will be observed that in this case one of the parents, *C. longifolium*, is much more robust in habit and growth than the other parent, *C. Schlimii*. No perceptible difference was observed between the plants raised from the two separate crosses; they agree in habit, foliage, structure and colour of flower, in fact in every particular.

* See p. 93.

It was also a great horticultural acquisition, for while the robust parent has flowers that cannot be called attractive, and the other parent is a difficult subject for the cultivator to deal with, the offspring has a most robust constitution, is remarkably floriferous with well-shaped flowers of a pleasing shade of pink, and it has been utilised for further experiments with the result that our gardens have been enriched by a race of hybrids of the greatest possible value from a decorative standpoint.* This group of hybrids which we have called the *Sedenii* group includes, among others, the following forms subsequently raised by Seden, namely, *C. × albo-purpureum*, *C. × Schroederæ* the finest of all of them for size and colour, *C. × cardinale*, *C. × Sedenii candidulum*, *C. × leucorhodum*, *C. × Brysa*, *C. × Perseus* and *C. × Phædra*. Scarcely less remarkable for distinctness and beauty among the numerous hybrid Cypripedes obtained by the same raiser are the following in the coriaceous section:—*C. × œnanthum*, *C. × selligerum*, *C. × Morgania*, *C. × microchilum*, *C. × Aphrodite*, *C. × Leeanum superbum*, *C. × Niobe*, *C. × H. Ballantine*, *C. × T. B. Haywood*, all well-known forms but of which the following remarks will not appear superfluous:—*C. × œnanthum* was the first secondary hybrid Cypripede raised, that is to say, a hybrid of which one parent is itself a hybrid, and in the progeny occurred the variability in colour since frequently observed among secondary hybrids. *C. × Morgania* is remarkable for its striking resemblance to the largest of all known Cypripedes, *C. Stonei platyternum*, and a still closer resemblance to it is seen in *C. × Morgania Langleyense*, of which *C. Stonei platyternum* is the pollen parent; *C. × Aphrodite* and *C. × microchilum* were the first hybrids in which *C. niveum* participated, while *C. × Niobe* and *C. × H. Ballantine* have each of them the rare and beautiful *C. Fairieanum* for one parent, and their flowers are among the most elaborately pencilled and veined yet obtained.

Passing to the popular genera *Lælia* and *Cattleya*—The first *Lælia* to flower raised by Seden was *L. × flammea*, a secondary hybrid from *L. × cinnabarinæ* crossed with *L. × Pilcheri*, for many years quite unique in colour but now approached in that respect by his later acquisitions *L. × Hippolyta* and *L. × Latona*. This was

* *Orchid Review*, I. p. 37.

followed by *L. × Sedenii*, a brilliant and distinct form from *Cattleya superba* × *Laelia elegans*, of which a single plant only was saved. Then succeeded *Cattleya × Mastersoniae* from *C. Loddigesii* × *C. labiata*, and *C. × Chamberlainiana* from *C. guttata Leopoldii* × *C. labiata Dowiana*, both of which are among the most beautiful Cattleyas yet raised from the crossing of *labiata* forms with other species. *Laelia × triophalma*, *L. × bella* and *L. × calistoglossa* are still among the most admired of those hybrids with a Lælio-Cattleya parentage, but the first place in this category must be given to *Læliocattleya × Digbyana-Mossiae*, the parentage of which is expressed by the name; it is undoubtedly one of the most beautiful and distinct not only of all hybrids but of all orchids; it is also a most interesting cross from a scientific standpoint, as proving the propriety of removing the first named or pollen parent from Brassavola to *Laelia*. Among later acquisitions with a Lælio-Cattleya parentage, *L. × Ascania*, *L. × Pallas*, *L. × Victoria*, *L. × eximia* and *L. × Proserpine* will long retain a place in orchid collections.

The remarkable generic hybrids raised in our nursery have been already mentioned.* More interesting hybrids than those obtained from the genera grouped around *Epidendrum*, and in which *Sophronitis grandiflora* has participated in the parentage, or more far-reaching in their probable relation to hybrids that may be obtained in the near future have never been raised. The first of these was *Sophrocattleya Batemaniana*, of which *Cattleya intermedia* is the pollen parent; it is named after the veteran orchidist to signalise his renunciation of his former abhorrence of hybrids.† This was followed by an equally beautiful form of which *Cattleya Loddigesii* is the second parent and is called *Sophrocattleya Calypso*, and still more recently by *Sophrocattleya Veitchii*, of which *Laelia elegans* is the seed parent,‡ and *Epiphronitis Veitchii*, of which *Epidendrum radicans* is the pollen parent.

Seden's first acquisition in *Dendrobium* was the sweet-scented *D. × Endocharis* which flowered for the first time in 1875; this was followed by *D. × Rhodostoma*, the most distinct and one of the handsomest of hybrid Dendrobies. He subsequently raised *D. ×*

* See p. 91. † Journ. of Royal Hort. Soc. Orch. Conf. p. 49.

‡ *Laelia elegans* is a Lælio-Cattleya, half Cattleya and half *Laelia*; it is therefore inexpedient to burden the nomenclature with a new compound to express so slight a technical difference.

splendidissimum from the same parentage as *D. × Ainsworthii*, of which therefore it is strictly but a fine variety, and this was afterwards followed by its variety *grandiflorum*, the *facile princeps* of the group of hybrids obtained from *D. nobile* and *D. aureum*. Later additions were made in *D. × euosmum*, a secondary hybrid, and which like most secondary hybrids proved a variable progeny, *D. × Schneiderianum*, previously raised from the same parentage by Holmes, *D. × Virginia*, *D. × Euryalus*, *D. × Cordelia*, and *D. × Aspasia* subsequently obtained by Mr. Winn, of Birmingham, from the same pair of species (*D. Wardianum* × *D. aureum*).

Among the finest Calanthes raised by Seden are *C. × Sedenii*, a secondary hybrid with *C. × Veitchii* for one parent; the very distinct *C. × lentiginosa* also a secondary hybrid raised from *C. × Veitchii* and *C. labrosa*, the sub-variety *carminalis* of this hybrid is one of the darkest-coloured Calanthes of the VESTITÆ section yet obtained; and *C. × Gigas*, one of the most robust forms in the section. Quite distinct from all these and bearing a strong analogy to Dominy's bigeneric hybrid *Phaiocalanthe irrorata* but far superior to it is *Phaiocalanthe Sedeniana*, but still unfortunately very rare, so few plants being obtainable from generic crosses; and lastly *Phaiocalanthe insperata* from *Phaius grandifolius* and *Calanthe masuca*, and thence the first Phaiocalanthe in which a species of the VERATRIFOLIE has participated in the parentage, the more remarkable since all attempts to cross species of the VESTITÆ section of Calanthe with species of the VERATRIFOLIE have hitherto failed.

Of the genera in which Seden was the first operator to obtain artificially raised hybrids, Chysis was the earliest. In this restricted genus two were raised, *Chysis × Chelsonii* and *C. × Sedenii*. Nearly contemporary with the first flowering of *Chysis × Chelsonii* was that of *Zygopetalum × Sedenii*, followed some years later by the generic hybrids *Zygocolax leopardinus* and *Z. Veitchii*. In Epidendrum, *E. × Obrienianum* was the first hybrid raised, and more recently the beautiful *E. × Endresio-Wallisii*. The first hybrid *Masdevallia* raised artificially was *M. × Chelsonii* which flowered in 1880, followed later by *M. × Gairiana*, *M. × glaphyrantha*, *M. × Ellisiana*, and *M. × caudata-Estradae*, all beautiful additions to the genus, and also the progeny from *M. Veitchiana* × *M. Barlowana* already mentioned.*

See p. 91.

Very beautiful and distinct hybrids were subsequently obtained in *Phalaenopsis* and named respectively *Rothschildiana*, *Harriett*, *F. L. Ames*, *John Seden* and *Vesta*; and in other genera *Cymbidium* \times *elatiorne-Lovianum* and *Phaius* \times *amabilis*.

One of the most interesting and, in a horticultural sense, one of the most useful of our latest acquisitions is *Disa* \times *Veitchii* raised from *D. grandiflora* fertilised with the pollen of *D. racemosa*. In this hybrid we have the handsomest garden plant yet raised artificially in the Tribe OPHRYDEE which we have not brought within the scope of this work. The genus *Disa* has been further enriched by two hybrids which have been raised in the Royal Gardens at Kew, one from *D. tripetaloides* ♂ and *D. grandiflora* ♀ called *D. × kewensis*; the other from *D. × Veitchii* ♂ and *D. tripetaloides* ♀ called *D. × Premier*.

We will now proceed to enumerate the most noteworthy results obtained by other operators, but our review of them must necessarily be a restricted one, especially of those that have flowered since the issue of the various parts of this work in which a description of them would otherwise have been inserted. Of a very large proportion of these we know nothing beyond the notices of them that have appeared from time to time in the periodical press, and of such we can only mention those that have been distinguished by some award or by a consensus of opinion respecting their merit. Another large contingent consists of progenies that have been derived from the same or reverse crosses as others that preceded them, and they must therefore, in the case of true hybrids, bear so near a resemblance to the older forms as to be synonymous with, or simply varieties of them. All such are purposely omitted where observed; and also all secondary hybrids in which the variability of the progenies is much greater. And lastly, there is another category of hybrids and *métis* whose origin is unknown or doubtful, and for which it is not easy to find a place in a systematic treatise on orchids.

Before Dominy had terminated his labours as an hybridist, and even before the first efforts of Seden had borne fruit, two handsome Cypripedes had been raised by Cross, Gardener to Lady Ashburton at Melchet Court in Hampshire: *Cypripedium* \times *Ashburtoniae* from *C. barbatum* \times *C. insigne* flowered in 1871; *C. × Crossii* from *C.*

insigne × *C. venustum* flowered two years later. Both hybrids are quite intermediate in character.

In the spring of 1874 *Dendrobium* × *Ainsworthii* flowered for the first time in Dr. Ainsworth's collection at Lower Broughton, near Manchester. It was obtained by Mitchell, Dr. Ainsworth's gardener, from *D. aureum* × *D. nobile*. Plants from the same cross were, however, raised by West about the same time at the Fairfield Nursery, near Manchester. Mitchell subsequently raised *Cattleya* × *Mitchelli* from *C. guttata Leopoldi* × *C. labiata Trianae*; the plant is said to have been thirteen years old when it flowered for the first time; also *Cypripedium* × *Ainsworthii*, a secondary hybrid with *C. × Sedenii* for one parent.

Two more hybrids shortly afterwards appeared in Manchester but raised by another operator, these were *Cypripedium* × *Swanianum* and *Dendrobium* × *Leechianum*, obtained by Swan, Gardener to Mr. Leech, of Fallowfield; the last named from the reverse cross of that which produced *D. × Ainsworthii*, and so closely resembling it that it can only be regarded as a variety of it.

Between 1876 and 1887 appeared a series of hybrid Cypripedes raised by the late Mr. J. C. Bowring, of Forest Farm, Windsor, of which *Cypripedium* × *concinnum* and *C. × gemmiferum* are EUCYPRIPEDIA and *C. × conchiferum* and *C. × stenophyllum* are SELENIPEDIA. He subsequently raised several others, some of them from the same pairs of species as previously obtained by other operators. In the same epoch was brought to light a batch of seedlings whose origin is not certainly known, raised by Mr. Robert Warner, of Broomfield, near Chelmsford. From their marked resemblance to each other and all possessing characters of *C. venustum* they may be assumed to have resulted from one cross in which *C. venustum* participated; they were named by Reichenbach *C. × discolor*, *C. × chloroneurum*, *C. × politum*, *C. × Meirax* and *C. × melanophthalmum*. Later from the same source appeared another batch from a different parentage and named *C. × Williamsianum*, *C. × Amesianum* and *C. × Measuresianum*. *C. × villosum* and *C. venustum* participated in the parentage of all these; in *C. × Williamsianum* *C. villosum* participated, meditately probably through *C. × Harrisianum*. Following close upon Mr. Bowring's earlier productions have appeared a long series of Cypripedes raised by Mr. D. O. Drewett, of Riding-Mill-on-Tyne, of which fifteen or more

have been named and published. Some of the later announcements have been derived from new crosses and are described as distinct and handsome additions to the genus; of such are *C. × pavoninum*, *C. × Beatrice*, *C. × Alice*, *C. × Constance* and *C. × Juno*. Here may be mentioned a series of Cypripedes which appeared contemporaneously with many of Mr. Drewett's productions, and which had their origin in one of the richest collections of Cypripedes ever brought together, that of Mr. R. H. Measures, at The Woodlands, Streatham. Among the best acquisitions made in The Woodlands collection are *C. × basileum*, *C. × Cymatodes*, *C. × Venus*, *C. × Cytherea*, *C. × Hera*, *C. Fairicano-Lawrenceanum*, besides several very beautiful secondary hybrids. Another large group of hybrid Cypripedes has originated in the collection of Mr. R. I. Measures, at Cambridge Lodge, Camberwell.* Very noteworthy are *C. × Apollo*, *C. × Bellina*, *C. × Diana*,† *C. × Flora*, *C. × Hisa*, all primary hybrids, and in addition several secondary hybrids and many others obtained from the same or the reverse cross as some previously raised by other operators, and being identical the first names have been properly retained for them.

In enumerating the foregoing long list of Cypripedes we have somewhat outstripped the chronological order of events; we will therefore record some meritorious acquisitions by operators who have since been removed from the scene of their labours. The first of these was Mr. Fraser, of Dencleugh, near Aberdeen, who raised the brilliant *Masdevallia × Fraseri*, *Cypripedium × Fraseri*, and a fine variety of *C. × Ashburtoniae* called *calopilum* from the same pair of species as Cross' type. Next followed Mr. Goss, of Torquay, who obtained *Calanthe × Sandhurstianæ* from the same parentage as *C. × Veitchii*, and which must be regarded as a highly-coloured variety of it. And lastly Dr. Harris, of Lamberhurst, Kent, who raised some highly interesting hybrids in *Laelia* and *Cattleya*, especially *C. × citrino-intermedia*, the first hybrid in which *C. citrina* has been successfully used, and so far as we know the only one. Dr. Harris also raised *C. × Harrisii*, *C. × Miss Harris*, *Laelia × Novelty*, subsequently

* This is a most interesting collection, particularly rich in Masdevallias and other Pleurothallids.

† A variety of *C. × Eyermanianum* previously raised by Messrs. Sander and Co. from the same pair of species (*C. barbatum* and *C. Spicerianum*).

obtained by Seden from the same parentage, and three or four Cypripedes from the same crosses as others that preceded them and which they resembled in every particular.

In the meantime two fine series of progenies from Calanthe and Dendrobium were maturing in the houses of Sir Trevor Lawrence at Burford, Dorking; the first of these to flower were the Calanthes of the VESTITÆ section, to which *C. × porphyrea* from *C. labrosa* and *C. vestita* must be assigned the first place for distinctness and beauty of coloration. A fine progeny has also been obtained from *C. rosea* (*Limatodes rosea*, Lindl.) and *C. × Veitchii*, which like most progenies with a hybrid parentage proved a variable one as regards the colour of the flowers; among the seedlings the forms named *Burfordiensis*, *versicolor*, *Victoria Regina* and *Veitchii lactea* are very attractive, and in addition to these one named *sanguinaria*, whose parentage was omitted to be recorded, is very distinct, the whole forming a group of orchids of the highest horticultural merit for winter decoration. This group was followed by the flowering of a scarcely less interesting progeny of secondary hybrids between *Dendrobium × Ainsworthii* and *D. Findlayanum*, of which the most distinct forms are named *D. chrysodiscus* and *D. melanodiscus*, the latter being from the reverse cross of the former. To this group were subsequently added *D. × Chrysosteles*, raised from *D. Wardianum* and *D. Linawianum*, and *D. Juno* and *D. xanthocentrum* from the reverse cross. Some beautiful hybrid Cypripedes have also originated at Burford, including *C. × Leeianum*, *C. × Laurebel*, *C. × Morgania Burfordiense*, from the same pair of species as Seden's hybrid; *C. × concolauvre*, and several secondary hybrids.

On the banks of the Tyne has originated another series of hybrids in which the field of operations has been more extended and the results consequently much more varied than in the series noted above. These hybrids were obtained by Mr. Norman C. Cookson, of Oakwood, Wylam-on-Tyne, and include among Cypripedes, *Cypripedium × Io*, *C. × Godseffianum*, *C. × plunerum*, *C. × Alcides*, *C. × Doris*, *C. × nitidissimum*, *C. × Sandero-superbiens*, *C. × aurosum*, many secondary hybrids of considerable horticultural merit; and also some of the finest acquisitions by other operators have been raised at Oakwood from the same pairs of species and have very properly received the same name; of such are *C. × Calypso*, *C. × Morganiae*,

C. × Niobe, *C. × cardinale*, *C. Ashburtoniae expansum*, *Dendrobium × Ainsworthii*, *Calanthe × Sedenii* and others. In other genera Mr. Cookson has also raised some remarkably fine hybrids including *Calanthe × Cooksonii*, *Cattleya × William Murray*, *Laeliocattleya × Phœbe*, *L. × Normanii*, *Dendrobium × Venus*, *D. × Cassiope*, *D. × Bryan*, *D. × Owenianum*, *D. × Sybil*, *Masdevallia × Courtauldiana*, *Phaius × Cooksonii*, the last named of exceptional interest from its being the first hybrid *Phaius*, of which the beautiful Madagascar species, *P. tuberculosus*, is one parent. The total number of hybrids raised by Mr. Cookson is probably greater than those obtained in any other private collection.

The genus *Masdevallia* has received especial attention from Captain Hincks, of Terrace House, Richmond, Yorkshire, who had added to it the following beautiful hybrids, *M. × Hinckiana*, *M. × Stella*, *M. × Cassiope*, *M. × Rushtonii* and *M. × Veitchiano-Estrade*. Further additions to the genus have been made by Sir Trevor Lawrence, Mr. D. O. Drewett, Mr. W. Thompson and Messrs. Sander and Co. Here may be noted three hybrids of great merit obtained by three different operators who appear to have desisted from further efforts. The first of these is *Zygotepetalum × Clayii* obtained many years ago by Colonel Clay, of Wallasy, near Birkenhead; the second *Dendrobium × Schneiderianum* raised by Holmes, Gardener to Mr. C. Moseley, of Grange Thorpe, Manchester; and lastly *Cypripedium × Lathamianum* by Mr. Latham, of the Botanic Garden, Birmingham.

Mr. Winn, of Selly Hill, Birmingham, has added to the list of hybrid orchids *Calanthe × Aurora*, *Cymbidium × Winnianum*, the second hybrid obtained in the genus, *Dendrobium × Aspasia*, previously raised by Seden from the same parentage, *D. × Nestor*, *Cypripedium × Edith Winn*, *C. × Sylva* and some secondary hybrids in *Cypripedium*. Captain Vipan, of Wansford, Northampton, has obtained *Cypripedium × Vipanii*, *C. × Sandersoni-superbiens* and *C. × Berenice*, the last named being the first hybrid known to us between racemose species of *EUCYPRIPEDIUM (philippinense × Lowii)* that has flowered. In Baron Schroeder's magnificent collection has been raised *Epidendrum × Delliense*, *Cattleya × Baroness Schroeder* and *Laelia × vitellina*, all new and distinct crosses; in this collection is *Calanthe × Baron Schroeder*, the finest hybrid *Calanthe* yet raised. Sir William Marriott has raised *Laelia Marriottiana* from *L. flava* and *Cattleya Skinneri* in his

collection at the Down House, Blandford, probably the first in which these two species have participated in the parentage, and *L. × Canhamiana*. In that of Mr. W. E. Brymer, at Ilsgton House, Dorchester, *Laeliocattleya × Brymeriana*, a hybrid of complex descent, and *Dendrobium × Benita*. In that of Mr. Ingram, Elstead House, Godalming, *Laeliocattleya × Ingramii*, *Cypripedium × L'Unique*, *C. × Adonis* and several secondary hybrids in *Cypripedium*. Mr. Hollington, of Forty Hill, Enfield, has obtained *Cypripedium × Aylingii*, *C. × Muriel Hollington* and *C. × Evenor*, all handsome forms of which *C. niveum* is one parent. The late Mr. Tautz, of Dibdin House, Ealing, raised two good forms in *C. × Cowleyanum* and *C. × Dibdin*. Mr. Vanner, of Camden Wood, Chislehurst, has obtained *Dendrobium × Vannerianum*, a Cypripede in the Selenipedium section, closely resembling *C. × leucorrhodum*, and also a seedling between two varieties of *Masdevallia Chimæra*, the first recorded instance in the Saccolabiate *Masdevallias*, but the cross having been effected between two varieties of one species the result is not a hybrid in the accepted sense of the word. Mr. Statter, of Stand Hall, Manchester, has raised *Cypripedium × Daviesianum*, several secondary hybrids in the same genus, and *Laeliocattleya Clive*. Mr. C. Richman, of Springfield, Trowbridge, exhibited at one of the meetings of the Royal Horticultural Society in May, 1893, a distinct hybrid Cypripede raised from *C. bellatulum × C. barbatum* and named *C. × Charles Richman*. And there are probably other amateur operators who have raised seedling orchids, but of which we have failed to acquire any cognisance.

Turning to the hybrids obtained by professional growers, by far the greater number of these have either originated in the establishment of Messrs. Sander and Co. at St. Albans, or have been acquired by that firm from the raisers. Their group includes a large number of Cypripedes, several of them secondary hybrids, also several hybrids in *Cattleya*, *Laelia*, *Dendrobium*, *Calanthe* and *Masdevallia*. Messrs. B. S. Williams and Son, of Holloway, have raised or acquired from other raisers a *Laeliocattleya*, some *Calanthes* of the *vestita* group, and several Cypripedes. Messrs. Low, of Clapton, have exhibited one *Laeliocattleya*, one *Cypripedium* of known and one of unknown parentage. Messrs. Seeger and Tropp, of Dulwich, have exhibited three or four secondary hybrid Cypripedes. Mr. Bull, of Chelsea, is credited with one hybrid *Cypripedium*; Mr. Lewis, of Southgate,

with two *Cattleyas* and one Cypripede; and Messrs. Heath, of Cheltenham, with one Cypripede. Messrs. Backhouse, of York, have raised one hybrid *Cattleya*; and Mr. Cypher, of Cheltenham, two handsome Dendrobes, of which one is a secondary hybrid.*

The hybrid orchids that have originated on the continent of Europe and in the United States of America are few indeed compared with British-raised seedlings. The first continental hybrids appeared in the horticultural establishment of M. Bleu at Paris, who has raised *Cattleya × calummata*, *Cypripedium × javanico-superbiens* and *Miltonia × Bleuana*, the last-named from *M. vexillaria*; *M. Roezlii*, the first hybrid obtained in the genus but which was shortly afterwards raised by Seden from the same pair of species; and many others. In Paris were also raised two hybrid Cypripedes by M. Bauer, of The Muette, viz., *C. × Carrierei* and *C. × Laforcei*. Other hybrids have been raised in France by M. Page, M. Paul Darblay, M. Godefroy and Madame Block.

A small group of hybrids are announced from Vienna, raised by M. Horn, who has charge of Baron Nathaniel Rothschild's collection at the Hohe Warte; his best acquisitions are *Cypripedium × Hornianum*, *C. × Pandora* and *Laelia × Horniana*. And in the Emperor of Austria's collection at Schönbrunn has been raised *Lycaste × Schoenbrunnensis*.

In Belgium a considerable number of hybrid or *métis* (mixed) Cypripedes have been published in the horticultural press, but in many cases the parentage has either been imperfectly rendered or only conjectured; others are manifestly from the same or reverse crosses of older hybrids; the largest number of these were raised in the horticultural establishments of M. Vuylsteke and M. Vervae at Ghent, and of M. Linden at Brussels; the others chiefly in the amateur collections of M. Hye-Leysen and the late M. Moens.

In America the hybridisation of orchids is quite in its infancy and thus far some of the results of two operators only have been announced, if we except a Cypripede of unknown origin in Mr. Kimball's collection at Rochester, New York. Mr. H. Graves, of Orange, New Jersey, is the most prominent amongst amateurs; he has raised *Cypripedium × Edwardii* from *C. superbiens* and *C.*

* This enumeration only holds good to date of going to press.

Fairieanum, presumably a distinct acquisition, *C. × calloso-Argus* and several other Cypripedes, some of which are from the same pairs of species as older hybrids, also *Phaiu. × hybridus* previously raised by Mr. Drewitt, of Riding-Mill-on-Tyne. Messrs. Pitcher and Manda, of Short Hills Nursery, New Jersey, have obtained several Cypripedes, of which *C. Constableanum* from *C. Dayanum* and *C. × Fairieanum* adds one more to the *vexillarium* group, many other Cypripedes most of them secondary hybrids, and *Dendrobium × Roeblingianum*, of which *D. Ruckeri*, a species now but seldom seen, is one parent.

LITERATURE.

The literature of the ORCHIDÆ is very copious. Besides the works especially devoted to the subject there is a large amount dispersed through botanical works that have been compiled in Latin, English, French, German and other European languages since the time of Linnaeus. Of the larger works devoted exclusively to orchids there are many of the highest excellence both as regards illustrations of particular species and the accompanying letterpress. Others are of a more popular kind exclusively devoted to showy species in cultivation and generally devoid of analytic figures showing generic or specific characters. Many of the treatises on the ORCHIDÆ forming part of the Floras of different countries, or other works of large scope have been compiled by botanists of eminence and are among the most valuable contributions to Orchidology extant; and scarcely less so are most of the papers on orchid subjects read before the Linnean Society and published in the Society's Journal. The subjoined list of published works arranged in chronological order includes, so far as we have been able to ascertain, all the most important from the earliest production of Linnaeus to those of the present time. On account of the great amount of orchid literature scattered through botanical and other periodicals since 1830 the list is far from being complete.

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Vol. I
2°

MANUAL

OF

ORCHIDACEOUS PLANTS

CULTIVATED UNDER GLASS IN GREAT BRITAIN.

PART V.

MASDEVALLIA.

FLEUROTHALLIS, CRYPTOPHORANTHUS, RESTREPIA,
ARPOPHYLLUM AND PLATYCLINIS.

JAMES VEITCH & SONS,
ROYAL EXOTIC NURSERY, 544, KING'S ROAD, CHELSEA, S.W.

1889

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PRELIMINARY NOTICE.

THIS Manual is being compiled to supply amateurs and cultivators of exotic Orchids with a fuller account of the principal genera, species and varieties cultivated under glass, than is contained in the Manuals hitherto in use.

The rapid extension of Orchid culture during the last quarter of a century, resulting from the increased taste for and appreciation of this beautiful and interesting order of plants, has, in our opinion, created the *desideratum* which we are now attempting to supply. The prominent place, too, occupied by Orchids in the columns of the Horticultural Press, and the surprising amount of practical and varied information respecting them disseminated through its agency, has also stimulated the desire to obtain all the leading facts in a condensed form, to which easy reference may at any time be made.

So numerous are the species and varieties of Orchids at present in cultivation, and to which additions are constantly being made by new discoveries and by artificial hybridisation, that the labour attending the compilation of a Manual sufficiently comprehensive to meet the wants of cultivators must necessarily demand much time. Moreover, the present unsatisfactory state of Orchidology, especially in its horticultural aspect and its complicated and unscientific nomenclature, have rendered the compilation of such a Manual within a stated time almost an impossibility.

Under these circumstances, and yielding to the solicitations of patrons and friends, we have decided upon issuing the work in parts, each part containing a monograph of the cultivated species and varieties of one of the most important genera, or of a group of genera.

Little explanation of the plan of the work is here needed; the parts as issued must speak for themselves. We have only to state that in the scientific classification and sequence of the genera we have followed, with but trifling deviations, the arrangement of Bentham and Hooker as elaborated in their *Genera Plantarum*, the most profound and, at the same time, the most intelligible exposition of the Orchideæ extant. In the nomenclature of the species, we have adhered to the Laws of Botanical nomenclature adopted by the International Botanical Congress, held at Paris in August, 1867.

In the description of the species, we have been compelled to use occasionally a few technical terms to avoid cumbrous circumlocutions; at the conclusion of the work we propose giving a glossary of the terms so used. In the cultural notes we have quoted temperatures in the Centigrade scale with the equivalent Fahrenheit readings, in the hope that the far more rational scale, now almost universally adopted in scientific investigations, may also come into use in horticulture. The literary references in italics indicate coloured plates of the species or variety described.

TRIBE—EPIDENDREÆ.

SUB-TRIBE PLEUROTHALLEÆ.

Cespitose herbs, with slender stems that are not pseudo-bulbous, monophyllous and terminated by a one- or many-flowered inflorescence.

PLEUROTHALLIS.

R. Brown in Aiton's Hort. Kew. ed. II. p. 211 (1813). Lindl. Gen. et Sp. Orch. p. 4 (1830). Benth. et Hook. Gen. Plant. III. p. 488 (1833).

Although *Pleurothallis* is one of the largest genera in the orchidean family, it has hitherto been thought of so little interest to cultivators that it has been passed over in silence by the compilers of every horticultural work on orchids with which we are acquainted, with the exception of Mr. E. S. Rand, who cursorily mentions it.* It has, however, a certain scientific importance as the typical genus around which other genera are grouped, forming the sub-tribe *Pleurothalleæ*, of which the most distinctive common characters are given above. This sub-tribe includes in the aggregate, according to Mr. Bentham's estimate, over 650 species, to which additions are frequently being made by new discoveries, so that this one sub-division contains probably more than one-tenth of the whole of the *Orchidæ*; the species are very unequally divided among ten genera,† some of whose names even are practically unknown to horticulture.

Upwards of 350 species of *Pleurothallis* are known to science, all natives of the mountains of tropical America, at a considerable elevation. They occur on the Andes from Bolivia to Mexico, ascending to 10,000—12,500 feet towards the southern limit of their range; they are also found on the mountains of Brazil and in the West Indies. Although upwards of 100 of the species have at different times been

* *Orchids, a description of the species and varieties grown at Glen Ridge, near Boston, U.S.A.*, p. 375.

† Thus, *Pleurothallis* 350, *Stelis* 150, *Physosiphon* 4, *Lepanthes* 40, *Restrepia* 20, *Brachionidium* 3, *Maudevallia* 100, *Arpophyllum* 6, *Octomeria* 10, *Meiracyllium* 3; all natives of tropical America, from southern Brazil to central Mexico, most of them alpine.

introduced into British gardens, but very few indeed have remained long in cultivation,* and scarcely a dozen have been considered worthy of being figured in works other than those purely devoted to science. The flowers of most of the known species are small, inconspicuous and without fragrance, but there are many of singular form and gem-like beauty which, requiring but little space for their cultivation, should induce amateurs to give some attention to them. The species described below are among the best known; the cultural treatment of these, as will be readily inferred from their alpine character, is that of cool orchids such as we have given in detail under *Masdevallia* and *Odontoglossum*.

To assist the reader to distinguish the species of *Pleurothallis* from those of the closely allied genera, we subjoin a diagnosis of the chief characteristics of the flower:—

The dorsal sepal is free; the lateral two are always coherent into one that is bifid or bipartite at the apex; the petals are shorter and narrower than the sepals; the lip, which is generally shorter than the petals, is articulated at the base of the column. The column is of the same length as the lip, or a little shorter; the pollinia are two in number, and are either pear-shaped or of sub-globose form.

In their vegetation the species of *Pleurothallis* are dwarf, often minute plants.—

The stems are simple, rarely exceeding a few inches in height, enclosed in sheathing scales, and terminating in a solitary leaf that varies in size and form in the different species. The inflorescence springs from the base of the leaf and is generally racemose, but sometimes a 1—2 or few-flowered peduncle.

Pleurothallis is derived from $\pi\lambda\epsilon\nu\rho\nu$ (pleuron), "a rib" or side, and $\theta\acute{\alpha}\lambda\lambda\omega$ (thallo), "to bloom," probably in allusion to the bilateral position of the floral segments with respect to the axis.

Pleurothallis Barberiana.

A minute stemless plant. Leaves petiolate, elliptic, half-an-inch long. Peduncles capillary (as slender as a hair), 2—4 inches long, drooping, 6—12 flowered. Flowers small; sepals free, oblong-lanceolate, aristate, whitish spotted with deep purple; petals ovate, apiculate, longer than the column, whitish with paler spots than the sepals; lip "a linear-oblong, terete, sub-clavate, solid body of purple colour blotched with

* See Hemsley's enumeration in the *Gardeners' Chronicle*, XV. (1881). p. 784; XVI. pp. 10 and 42.

deeper purple, rounded at the tip, and with two teeth opposite the very short claw." Column yellowish.

Pleurothallis Barberiana, Rehb. in Gard. Chron. XVI. (1881), p. 6. *Bot. Mag.* t. 6886. *Masdevallia Culex*, Hort.

The above description conveys but an imperfect conception of this miniature orchid, which is well deserving a place in every collection on account of the singular beauty and curious structure of its flowers that have the fanciful resemblance of a species of gnat. It was introduced by Messrs. Low and Co., of Clapton, who gave no locality, but the plant is generally believed to be of Colombian origin. It is dedicated to Mr. Barber, of Spondon, near Derby.

P. *insignis*.

Stems slender, 1—2 inches long. Leaves linear-oblong, as long as the stems. Peduncles as long as the leaves, two or more flowered. Flowers large for the genus; sepals ovate-lanceolate, prolonged into slender tails 2 inches long, yellowish white with longitudinal red streaks on the dilated part; petals linear-oblong, "toothed at the tip, and with a filiform tail as long as the sepals inserted between the teeth"; lip three-lobed, the lateral lobes linear, turned upwards and outwards, colourless, the middle lobe linear-oblong, obscurely papillose, with a dense tuft of small bristles at the apex, chocolate red.

Pleurothallis insignis, Rolfe in Gard. Chron. I. s. 3 (1887), p. 477. *Bot. Mag.* t. 6936.

This is one of the largest flowered species of *Pleurothallis* yet known; the sepals are prolonged into slender tails like those of a *Masdevallia*, and its curiously-shaped bearded lip reminds one of the closely allied species, *Pleurothallis glossopogon*, which it much resembles, and under which name it was first distributed. It differs, however, from that species in its much larger flowers in which the sepals are not puberulous, also in the form of the leaves, and in some other minor characters. It was introduced by us in 1879 from New Granada.

P. *Leucopyramis*.

Stems 2—3 inches high, slender, invested with dark brown, almost blackish membranous sheaths. Leaves lanceolate-ligulate, as long as the stems. Peduncles slender, erect racemose, the rachis zigzag, many-flowered. Flowers white; upper sepal lanceolate, arched, keeled behind; connate lateral sepals similar, two-keeled, bidentate at the apex; petals and lip very minute, rhombo-ligulate. Column tridentate at the apex.

Pleurothallis Leucopyramis, Rehb. in Linnæa XLI. p. 47 (1877). *Id. Xen. Orch.* III. p. 14.

A very attractive species with small milk-white flowers that are produced freely in the autumn months. Nothing certain appears to be known of its origin, beyond the fact that it was originally in the collection of the late Mr. Wilson Saunders at Reigate, whence it passed to the Botanic Garden at Hamburg. It was also in cultivation in our Chelsea Nursery some years ago, and is believed to have been sent to us from Costa Rica, by Endres. The notice of it in this place may tend to preserve it from oblivion.

P. picta.

A densely-tufted dwarf plant. Leaves linear-spathulate, 1—2 inches long. Peduncles thread-like, erect, as long again as the leaves, loosely racemose above. Flowers small but beautifully coloured; sepals yellow streaked with red, the upper one ovate-lanceolate, acute, the connate lateral two similar, bifid at the tip; petals and lip very minute, the former linear-lanceolate acute, the latter oblong-obtuse, furrowed.

Pleurothallis picta, Lindl. in Bot. Reg. XXI. sub. t. 1797 (1836). Id. t. 1825. Id. Fol. Orch. Pleur. No. 222. Gard. Chron. II. s. 3 (1887), p. 431. *P. surinamensis*, Focke in Miquel's Stirpes Surinam, t. 646.

Introduced by Messrs. Loddiges from Demerara in 1834, and occasionally met with in cultivation since. It is closely allied to the equally interesting *Pleurothallis Grobyi* from the same country, which appears to be lost to cultivation; the *P. picta* of the *Botanical Magazine*, tab. 3897, is a totally different species, viz., *P. strupifolia* (Lindl.). "Although a Pleurothallis—and it might be a very unfortunate thing to be a Pleurothallis—*P. picta* is really a little gem, its numerous racemes of bright yellow and red flowers being very attractive." *

P. punctulata.

Stems about 2 inches high, slightly two-angled. Leaves lanceolate-oblong, sub-acute, narrowed below into a short petiole, blade 3—3½ inches long, erect, exceedingly stiff and leathery, glaucous on the back. Peduncles shorter than the leaves, sheathed at the base by a whitish tubular spathe, one-flowered. Flowers 1¾ inches across the sepals when spread out; upper sepal broadly lanceolate, acute, light yellow spotted with brown-purple; lateral sepals "connate into a concave, oblong body, the minute acute points only free," coloured like the upper one; petals broadly lanceolate, one-third as long as the upper sepals, light vinous red with brown-purple spots; lip oblong, obtuse, concave, papillose above, deep maroon-purple. Column terete with two minute cirri at the apex.

Pleurothallis punctulata, Rolfe in Gard. Chron. IV. s. 3 (1889), p. 756.

* Gard. Chron. loc. cit. supra.

Introduced by us from New Granada in 1885. As may be gathered from the above description, the flowers are large for the genus and handsomely coloured; the species is therefore worthy of a place in every representative collection of orchids. "A curious feature in the plant is to be seen in the leaf, which has a sharp twist at the base, and by which the flower hangs pendulous beneath it."

P. Roezlii.

Stems slender, erect, 3—6 inches high, clothed with pale brown, scarious sheaths. Leaves oblong-lanceolate, emarginate or acute, 5—8 inches long, very leathery, light grass-green. Peduncles longer than the leaves, dull purple, with 2—3 joints, at each of which is a whitish, sheathing, closely appressed, membranous bract, and a similar one at the base of each pedicel; racemes nodding, 5—9 or more flowered. Flowers pendulous, partially expanding, deep sanguineous purple; sepals 1½ inches long, the upper one elliptic-oblong, concave, keeled behind; the lateral two connate into an oval blade with two keels beneath; petals like the upper sepal but smaller; lip tongue-shaped, the margins of the basal half inflexed, the distal half pubescent above. Column white.

Pleurothallis Roezlii, Rchb. in *Linnæa* XLI. p. 13 (1877). *Godefroy's Orchidophile*, 1888, p. 80. *P. laurifolia*, Rchb. in *Xen. Orch.* II. p. 31 (1862), not *Humb. et Kunth*.

According to the *Orchidophile*, this plant was discovered by Roezl* in the vicinity of Sonson, situate at a considerable elevation on the western slopes of the central Cordillera of New Granada. As it is said to have been found growing under the same conditions as *Masdevallia macrura*, also one of M. Roezl's discoveries, that is to say, "on the moss-covered blocks of granite that are found scattered over the ground around the town," it may be assumed to have been first detected at the same date as the discovery of that plant, or 1874. It was introduced into France by M. Kienast-Zöll, a zealous orchid amateur of Zurich, and was exhibited by M. Godefroy, of Argenteuil, near Paris, at one of the Royal Horticultural Society's meetings in March, 1885, when it became known to British cultivators for the first time. The above description was taken from a plant in the collection of Sir Trevor Lawrence, Bart., at Burford Lodge, near Dorking. The flowers of this *Pleurothallis* are the most richly coloured yet seen in the genus.

* The only information given in *Linnæa*, respecting the discovery of the plant, is contained in the following brief sentence:—"Hic vir (Roezl) plantas vivas collegit quæ miserime perierunt."

CRYPTOPHORANTHUS.

Rodriguez Gen. et Sp. Orch. nov. II. p. 79 (1881). Rolfe in Gard. Chron. II. s. 3 (1887), p. 692.

This is a genus recently founded for the reception of some eight or ten species at present known, some of which had been previously referred to *Pleurothallis* and others to *Masdevallia*, but all showing the same structural peculiarity in their flowers, and differing essentially from both genera in the following character as described by Mr. Rolfe, of the Kew Herbarium, in the *Gardeners' Chronicle*, loc. cit. supra :—

"The flowers do not open at all in the ordinary manner, but the sepals remain united both at base and apex; two small lateral openings on either side, where the upper sepal joins the lateral ones, being the only openings into the flower."

These lateral openings have suggested the name Window-bearing for these curious orchids, a designation by which they will probably be hereafter popularly known. The scientific name *Cryptophoranthus** refers to the hidden parts of the flower; the petals, lip, &c., being concealed within an almost closed flower, the only opening into which is by a pair of small windows at the side.

The first species of the group now proposed to be brought under *Cryptophoranthus*, that became known to science was described by Dr. Lindley, in the *Botanical Register* for 1836 (sub. t. 1797), under the name of *Specklinia atropurpurea*, but which he subsequently transferred to *Pleurothallis* (Bot. Reg. 1842, misc. p. 68); three years later this same plant was figured and described by Sir William Hooker, in the *Botanical Magazine*, t. 4164, as *Masdevallia fenestrata*, Lindl. MS. Mr. Bentham, when dealing with it for the *Genera Plantarum*, admitted that it had apparently with equal right been published in both genera.† This instance is adduced here in order to show the difficulty experienced by these eminent botanists in determining the systematic place of the plant—a difficulty that has arisen in a scarcely less degree with other species that have since been brought to light, and which are now grouped with it. To obviate this difficulty, it is proposed to adopt the genus *Cryptophoranthus*, which the Brazilian botanist Rodriguez created for the reception of three Brazilian species described by himself, and which he was unable to refer to any known genus. To these,

* From κρυπτός (kruptos), "hidden," φέρω (pheros), "bearing," and ἄνθος (anthos), "a flower." The compound is non-classical and cumbersome, and it is to be regretted that a more simple designation was not selected by the author.

† Jour. Linn. Soc. XVIII. p. 292.

Mr. Rolfe, of the Kew Herbarium, has added *Pleurothallis atropurpurea*, Lindl. (*Masdevallia fenestrata*, Lindl.), and two or three others of later introduction, all evidently allied to the Rodriguezian species by the same peculiarity of structure in the flowers. The genus "is not included in the main body of the *Genera Plantarum*, but Mr. Bentham obtained Rodriguez's work in time to mention it in the addenda" (p. 1225), where, however, it is reduced to *Pleurothallis*. It will be easily understood from the foregoing how close is the connection between the three genera *Pleurothallis*, *Masdevallia*, and *Cryptophoranthus*; the last named is separated from the two former by the character described above and no other, and the only essential difference between *Pleurothallis* and *Masdevallia* is, that in the latter the sepals are united at their base into a tube, and when this is extremely short or nearly obsolete as in *Masdevallia platyrhachis*, the two genera merge into each other. *Restrepia*, although in the same natural group, is separated from these three genera by its four pollinia, they having only two.

The introduction of the genus into these pages is for the express purpose of bringing under the notice of cultivators two of the best known species included in it, the first having an exceptional interest attached to it on account of the classical investigation respecting the fertilisation of its flowers by the greatest English naturalist of the present century, and the second on account of its bearing the name of one of the most respected of English orchid amateurs of the same period.

Cryptophoranthus atropurpureum.

Stems tufted, 2—3 inches high, clothed with sheathing scales, monophyllous. Leaves elliptic-oblong, acute, 2—4 inches long, bright green above, purplish beneath. Peduncles 2—3 or more from the base of each leaf, one-flowered. Flowers about an inch long, somewhat resembling a bird's head, brownish purple; sepals coherent except at a small opening below the apex which is turned upwards, gibbous below at the base; petals ovate, acute, parallel with the column; lip oblong, acuminate, channelled above and toothed towards the apex. Column semi-terete, the petals, lip and column all minute and concealed by the united sepals. Pollinia 2.

Cryptophoranthus atropurpureum, Rolfe in *Gard. Chron.* II. s. 3 (1887), p. 693. *Specklinia atropurpurea*, Lindl. in *Bot. Reg.* sub. t. 1797 (1836). *Pleurothallis atropurpurea*, Lindl. in *Bot. Reg.* 1842, misc. p. 81. *Id. Fol. Orch. Pleuroth. No. 107. Masdevallia fenestrata*, Lindl. ex Hook. *Bot. Mag.* t. 4164 (1845).

Introduced from Jamaica to the Royal Gardens at Kew by Purdie in 1843; it had, however, been made known to science seven years previously from dried specimens received from the same island; it also occurs in Cuba. For many years after its introduction it remained in cultivation under the name of *Masdevallia fenestrata*, both at Kew and in a few other orchid collections, rather as a

curiosity than from any other cause, till the late Mr. Darwin showed that the remarkable structure of its flowers rendered it more worthy of attention than it had previously received. He pointed out that the manner in which the flowers are fertilised was altogether unknown, and that he himself failed to make it out satisfactorily. As already stated, the plant has thus acquired a special interest for all those who observe the wonderful contrivances existing throughout the whole race of orchids for the purpose of securing the perpetuation of the species. No apology is needed for introducing here Mr. Darwin's account of the flower of this curious species :—



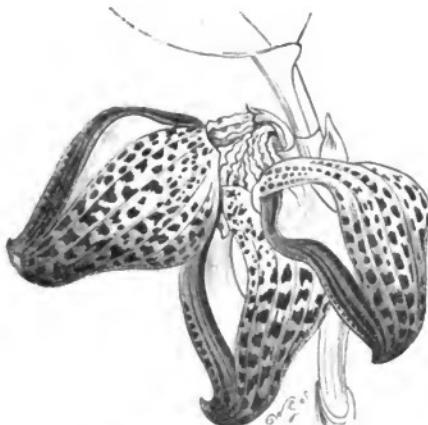
Cryptophoranthus stropurpureum.

"*Masdevallia fenestrata* is an extraordinary flower, for the three sepals always cohere together and never open. Two minute lateral oval windows, seated high up in the flower and opposite each other, afford the only entrance into the flower; but the presence of these two minute windows shows how necessary it is that insects should have access in this case as with other orchids. At the bottom of the roomy and dark chamber formed by the closed sepals, the minute column is placed, in front of which the furrowed labellum stands, with a highly flexible hinge, and on each side the two upper petals,

a little tube being thus formed. Hence, when a minute insect enters, or a larger insect inserts its proboscis through either window, it has by touch to find the inner tube in order to reach the curious nectary at its base. Within this little tube formed by the column, labellum and petals, a very broad and hinged rostellum projects at right angles, the under surface of which is viscid; the minute caudicles of the pollinia projecting out of the anther case, rest on the base of the upper membranous surface of the rostellum. The whole structure of the flower seems carefully intended to prevent the withdrawal of the pollinia, as well as their subsequent insertion into the stigmatic chamber. Some new and curious contrivance has here to be made out."—*Fertilisation of Orchids*, pp. 168-69.

C. Dayanum.

Stems 2-3 inches high, clothed with broad sheathing scales, and bearing a solitary oval leaf 3-4 inches long and 2-3 inches broad,



Cryptophoranthus Dayanum.
(From the *Gardeners' Chronicle*).

tinged with purple when mature. Peduncles from the base of the leaf, very short, one-flowered. Upper sepal joined to the lower connate two at base and apex, ovate-oblong, acute, slightly convex, and with 6-7 shallow keels above, pale yellow spotted with deep reddish purple, the spots smaller and more numerous on the basal portion; lower connate sepals similar with inflexed margins, with a broad keel below and a gibbosity at the base, buff-yellow spotted with purple within, pale buff-yellow beneath, the inflexed margins purple; petals

and lip very minute, pale yellow, the former oblong, obtuse, the latter tongue-shaped.

Cryptophoranthus Dayanum, Rolfe in *Gard. Chron.* II. & 3 (1887), p. 693.
Masdevallia Dayana, Rchb. in *Gard. Chron.* XIV. (1880), p. 295. *Id. XXVI.* (1886),
p. 428, icon. xyl.

This curious plant was first brought under notice by the late Mr. John Day, who acquired it at a sale of orchids at Stevens' Rooms in 1872, when it was offered as a new species of *Restrepia*; it had been sent there by M. Linden, of Ghent, and had presumably been received from New Granada, from which country it was afterwards sent to us by Gustav Wallis. It flowered for the first time in this country in Mr. Day's collection at Tottenham in 1875.

RESTREPIA.

Humbl. et Kunth, Nov. Gen. et Sp. I. p. 366, t. 94 (1815). *Lindl. Gen. et Sp. Orch.*
p. 14 (1830). *Benth. et Hook. Gen. Plant.* III. p. 491.

The *Restrepias* form a group of small, often minute plants, including about twenty species, all natives of the mountains of tropical America, from Brazil to Mexico, on which they occur at a considerable elevation, growing among moss on the stems of trees and on rocks, but always where the climate is humid. The genus is closely allied to *Pleurothallis*, from which there is little to separate it besides its greater number of pollinia, and its one-flowered peduncles.

The essential characters of the flowers are:—

The dorsal sepals and petals are free, thread-like, and have a small gland at their apex; the lateral sepals are much broader and are coherent; the labellum is generally flat, and is articulated with the base of the column, which is elongated. The pollinia are four in number, and are sub-pyriform or globose.

In their vegetation the *Restrepias* present much the same characteristics as *Pleurothallis*, which need not be here repeated.

About ten species have at different times been introduced into European gardens, all remarkable for the peculiar form of their flowers, some of whose parts bear a fanciful resemblance to the antennæ of certain insects. Some of the species flower several times during the year from the same growth, so that there is scarcely any season in which these curious flowers may not be seen. The genus is dedicated to Joseph E. Restrep, who first investigated the natural history of the Antioquian Andes.

The four forms described below are the most interesting of the group known to us. Their cultural treatment is the same as that of *Masdevallia*.

Restrepia antennifera.

Stems 2—4 inches high, clothed with loosely imbricating spotted sheaths. Leaves ovate, acute, $2\frac{1}{2}$ — $3\frac{1}{2}$ inches long, leathery. Peduncles slender, longer than the leaves. Flowers large for the genus; upper



Restrepia antennifera.

sepal lanceolate, tapering into a filiform tail, pale yellow dotted with red; connate lateral sepals oblong, concave, boat-like, bifid at the apex, bright ochreous yellow densely spotted with brown-purple, the spots arranged in close-set rows; petals like the upper sepal but smaller;

lip oblong, one-third as long as the lateral sepals, appressed to and coloured like them. Column with two narrow toothed wings.

Restrepia antennifera, Humbt. et Kunth. Nov. Gen. et Sp. I. p. 367, t. 94 (1815). Lindl. Gen. et Sp. Orch. p. 14 (1830). Id. Fol. Orch. Restr. No. 2. *Illus. hort.* 1869, t. 601. *Bot. Mag.* t. 6288. *R. maculata*, Lindl. Orch. Lind. No. 19. *R. guttata*, Lindl. Fol. Orch. Restr. No. 3.

This is the largest flowered species of *Restrepia* known, and the one most generally cultivated. It is that upon which the genus was founded by Humboldt and his collaborator Kunth, it having been discovered by the distinguished traveller himself at the beginning of the present century, growing on the trunks of trees at 9—10,000 feet elevation, near Pasto, in southern New Granada. It was subsequently detected by Linden (Merida, Bogota), Schlim (Ocaña), Wallis, and other collectors in different localities in New Granada, and even in Venezuela, at altitudes ranging from 7,000 to 12,000 feet. It is thus spread over a large extent of territory, and is found to vary slightly in foliage, size and colour of flower, and in some minor particulars. The form known in gardens as *Restrepia maculata*, which was gathered by Linden at Salto de Teguendana, at 7,000 feet elevation, is a more robust plant than the common type, and has somewhat larger flowers, with the lower connate sepals of a deeper yellow. Another form, to which Lindley doubtfully gave specific rank under the name of *R. guttata*, is a very beautiful one, of which the sepals have purple-crimson spots on a white ground.

R. elegans.

A small tufted plant, smaller in all its parts than *Restrepia antennifera*. Stems 1½—3 inches high, clothed with stiffish scarious scales. Leaves elliptic, sub-acute, 1½ inches long. Peduncles usually in pairs, slender, erect. Upper sepal erect, lanceolate, prolonged into a straight tail as long as itself, basal portion white, streaked with purple, tail yellow; connate lateral sepals oblong, concave, yellow dotted with purple; petals similar to the upper sepal, but only half the size; lip clawed, oblong, emarginate, half as long as the connate lateral sepals, and coloured like them. Column slender, bent, whitish.

Restrepia elegans, Karst. Ausw. neuer Gewächse Ven. *fide Bot. Mag.* t. 5966 (1872). Van Houtte's *Fl. des Serres*, VII. t. 743 (1851). Lindl. Fol. Orch. Restr. No. 2. *R. punctulata*, Lindl. in lit. 1846.

A pretty little orchid, much resembling *Restrepia antennifera*, of which it is the representative on the Venezuelan Cordillera, in the province of Caracas. It occurs in the neighbourhood of Tovar, at

an elevation of 5—6,000 feet, growing on the mossy trunks of trees; in this locality it was discovered many years ago by Karsten, a German traveller, and re-discovered some years afterwards by the Belgian collector, Funck, through whom it was introduced into European gardens by M. Linden, about the year 1850.

R. pandurata.

Stems 1—2 inches high, clothed with pale loosely imbricating membranous sheaths. Leaves ovate, acute, $2\frac{1}{2}$ inches long, very stiff and leathery, deep green above, dull purple beneath. Peduncles slender, shorter than the leaves, several in succession produced from the base of each leaf, pale green speckled with dull purple, one-flowered, the ovary sheathed by an acute bract. Upper sepal narrowly lanceolate, tapering into a short tail whitish with purple veins and tip; lateral sepals connate into an oblong, emarginate, concave blade, whitish densely spotted with crimson-purple, the spots arranged in longitudinal lines; petals like the upper sepal, but much smaller, and with three purple streaks on the dilated part; lip coloured like the connate sepals, with the spots more scattered, panduriform, emarginate, with a long bristle on each of the basal lobes. Column elongated, clavate, arching, with two orange spots at the base and a purple streak above them.

Restrepia pandurata, Rehb. in lit. ad. F. W. Moore, Hort. bot. Glasnevin.

A very floriferous species that has been for some time in cultivation in the Royal Botanic Garden at Glasnevin. It has also been imported by us from New Granada, which is thence known to be its native country, but the locality in which it occurs has not been communicated to us. The spots on the connate sepals and lip, when viewed through a pocket lens, are of gem-like brilliancy, and form one of the most attractive of floral objects.

R. xanthophthalma.

A dwarf tufted plant. Stems 1—2 inches high, clothed with imbricating membranous sheaths. Leaves linear-oblong, obtuse, as long as the stems. Peduncles shorter than the leaves, pale yellow, spotted with purple. Upper sepal subulate with a clubbed tip; lower connate sepals oblong, concave, bifid at the apex; lip oblong, rounded at the apex, about one-third as long as the connate lateral sepals.

Restrepia xanthophthalma, Rehb. in Hamb. Gartenz. XXI. p. 300 (1865). R. Lansbergii, Bot. Mag. t. 5257.

A native of Guatemala, from which country it was sent to the Royal Gardens at Kew by Salwyn, about the year 1860. Although one of the prettiest of the small-flowered Restrepias, it is now rarely

seen in orchid collections. *Restrepia Lansbergii* (Rchb.), with which *R. xanthophthalma* has been confounded, is evidently a different plant* that was discovered by Wagener in 1850, in Caracas, and introduced by him into European gardens.

MASDEVALLIA.

Ruiz et Pav. Fl. Peru et Chili, Prod. 122, t. 27 (1794). Benth. et Hook. Gen. Plant III. p. 492 (1883).

In Masdevallia we have a genus of plants as remarkable for the uniformity of their vegetation as for the diversity of form and colour displayed in their flowers. Striking as are the grotesque shapes assumed by the flowers of some of the species, perhaps still more so is the extraordinary brilliancy of the colours of others, while in strong contrast to these, there are other species whose flowers are of so homely a hue as to fail altogether to attract the favour of the greater number of orchid cultivators.

The structure of the flowers of Masdevallia presents a curious anomaly when compared with that of the flowers of many of the genera that find favour with amateurs, such as Cattleya, Dendrobium, many Odontogloss and Oncids, etc., in which the lip is often enormously developed, apparently at the expense of the other floral segments, and it is also the most richly-coloured of all the segments. In Masdevallia, on the contrary, the lower whorl of floral segments—the sepals, as they are conventionally called—are the most developed and the most richly-coloured parts of the flower, this development being, no doubt, at the expense of the petals and lip, which are reduced to minute organs† that have but an insignificant influence on the aspect of the flower, and which are not infrequently quite concealed within the tube formed by the cohesion of the sepals at their basal end. Another peculiarity, although not confined to this genus, is seen in the sudden contraction of the sepals into long filiform tails, which are often of a colour different from the basal or tubular portion, and which contribute much to the bizarre appearance of the flowers.

* See Xen. Orch. I. p. 170, t. 60.

† In *Masdevallia Chimera*, *M. Chestertonii* and most other saccolabiate species, the lip is moderately large in comparison with the size of the entire flower, while in *M. Gargantua*, *M. platyglossa*, *M. velifera*, and other coriaceous species it is quite a conspicuous organ, but always less than the sepals.

Curious as are these peculiarities in structure, it is certain that they have an important bearing on the economy of the plants with an especial aim to the fertilisation of the flowers by insect agency, since it is impossible to see by what other means this is effected. The gorgeous colours of the sepals of some species, and the powerful odour (almost fœtor) of the labellum of others have doubtless been given them to attract insects to the flower; these would naturally alight either on the broad lateral sepals, or, where that organ is large enough, on the labellum, which is usually fluted or channelled, or, as in the saccabiate group, curiously sculptured, but in such a way as to afford a guide to an insect to the bottom of the sepaline tube where honey would be most likely to be secreted, although we have never detected any such secretion in any of the species cultivated by us. It is difficult to see how an insect that has once made its way to the foot of the column, *via* the labellum, can withdraw without carrying away the very small and very light pollinia, and which drop from the anther chamber (*clinandrum*) upon the slightest touch; moreover the labellum itself is, in the majority of the species, parallel with the column and almost adpressed to it except at the reflexed tip, so that an insect could scarcely make its escape that way without either touching the rostellum or some other part of the sexual apparatus. In the same way, an insect loaded with one or more of the pollinia, on entering a second flower would scarcely fail to deposit them on the stigmatic surface, where they would be retained by the viscid secretion. No instance of a *Masdevallia* being self-fertilising has yet been observed by us, but at least two undoubted natural hybrids (*see infra*) have been introduced with one or other of the recognised parents; it is not possible to imagine that the cross could have been effected otherwise than by insect agency.

The essential characters of *Masdevallia* are:—

The *sepals* are connate at the base, usually into a sub-cylindric or broadly campanulate tube, the free portions, with very few exceptions, being produced into long, slender tails.

The *petals* are small, parallel with the column, and generally narrow.

The *lip* is also small, polymorphous, and articulated at the base of the column.

The *column* is either margined or winged, and is sometimes produced at the base into a short foot; the pollinia are two, without caudicle.

The *capsule* is cylindric or fusiform, six-ribbed, from one-half of an inch to an inch long.*

In their vegetation the *Masdevallias* are cæspitose or tufted herbs without pseudo-bulbs.—

* In *Masdevallia Chimæra* and other saccabiate species, the capsule is ovoid-orbicular, about as large as a medium-sized gooseberry, with three pairs of prominent ribs, more or less serrate at the edge.

The stems are short, erect, invested with membranous sheaths, and monophyllous. The leaves vary but little in form, but considerably in size in the different species. They are usually lanceolate, oblanceolate, or elliptic, attenuated below into channelled foot-stalks, and very leathery in texture. The peduncles, which spring from the base of the foot-stalk, are sometimes clothed with a scarious sheath, or are distinctly jointed with a small bract at each joint, and at the base of the ovary, often one-flowered, but sometimes 2—5 flowered, or terminating in a many-flowered raceme.



Capsules of *Masdevallia*—(1) *Veitchiana*. (2) *maculata*. (3) *Chimera*.

The genus *Masdevallia* was dedicated to Joseph Masdeval, a Spanish physician and botanist of the eighteenth century, by Ruiz and Pavon, two botanists of the same nationality, who were sent out to Peru by the Spanish Government in 1777 to investigate the Cinchona forests of that country; and who, during their stay in South America, compiled a Flora of Peru and Chili. The type species is Peruvian, and was named by them *Masdevallia uniflora*, a plant that has not been gathered by any modern collector, but which may be still lurking in the remote valley high up on the Andes, where first discovered; its habitat, according to the founders of the genus, is "in rocky places near Huassahuassi," wherever that may be.

There is scarcely a genus belonging to the Orchidæ that has been more rapidly extended of late years, through the discoveries of botanical travellers, than *Masdevallia*. *Masdevallia uniflora* was the only species known to its founders, and when, in 1832, Dr. Lindley published the third part of his *Genera and Species of Orchidaceous Plants*, only two more were known to him, *M. caudata* and *M. infracta*.

Thirty years later Reichenbach enumerated thirty-six species in Walpers' *Annales Systematicae*, but from that time forwards an almost uninterrupted stream of new species was poured into Europe, either as living plants or as dried specimens, so that Mr. Bentham, when dealing with *Masdevallia* for the *Genera Plantarum*, estimated the number at over 100: * and although some of the Reichenbachian species have to be reduced to varieties of previously known types, the number 125 cannot be regarded as an exaggerated estimate at the present time. Of these probably upwards of eighty have been, and may still be in cultivation in botanic gardens and in private collections; but many of them possess so little interest for amateurs in general, that most of such are purposely omitted in the synopsis that follows.

No sectional divisions of the genus were proposed by Mr. Bentham, the extreme difficulty of determining sectional characters from dried specimens alone, especially when the series is imperfect, being almost insuperable. Scattered through his numerous notes and descriptions of species published in the *Gardeners' Chronicle* and elsewhere, Reichenbach has indicated various sectional divisions, but nowhere do we find them brought together into a systematic form. That *Masdevallia* is not a mere aggregation of species is manifest enough from a comparison of such well-known species as *M. Veitchiana*, *M. Reichenbachiana*, *M. Chimera*, *M. Estradae*, *M. polysticta*, *M. triariella*, etc., etc., hence the want of a scientific classification of the included species has long been felt, both by botanists and by horticulturists. As a step in that direction we have brought together those Reichenbachian sections that include most of the species hereafter described, and have indicated the characters upon which they have been framed,† but, as stated above, other species are cultivated in a few collections, and many more have been described from dried specimens, while others again are but still very imperfectly known. To draw up sectional characters for the whole of the genus is therefore not here intended, as the necessary material for it is not yet available.

I. EUMASDEVALLIA. Lip generally ligulate, or linear-oblong, usually nearly flat, more or less fleshy; petals flat, often somewhat oblique; sepals united below into a tube which is generally but not always longer than broad, the sepaline tails variable in length, breadth, colour, &c.

A very large section, comprising the great bulk of the genus and not easily confounded with the remaining sections. It admits of sub-division into

* With the remark that "plures tamen hortulanis potius quam botanicis distincte," which later examination has amply confirmed.

† In this we have been assisted by Mr. R. A. Rolfe, of the Kew Herbarium, to whom we tender our best acknowledgments. Mr. Rolfe kindly placed his notes on this subject at our disposal, and at his suggestion we have reduced several of the Reichenbachian sections to sub-sections of *EUMASDEVALLIA*. We have also to express our indebtedness to Sir Trevor Lawrence, Bart., M.P., Mr Sydney Courtauld, Capt. Hincks, Mr. Charles Winn, and Mr. F. W. Moore, of Glasnevin, for materials that have enabled us to include in the synopsis that follows several rare and little known species which, without such help, must have been unavoidably omitted or but imperfectly described.

groups of minor importance, which on the whole are very natural and fairly well characterised, thus :—

1. *Coriaceæ*. Perianth distinctly coriaceous, varying from shortly and broadly to narrowly tubular, sepaline tails variable, usually short and rigid; peduncles one-flowered; bracts generally small.

To this sub-section belong *Masdevallia calura*, *civilis*, *coriacea*, *elephanticeps*, *floribunda*, *Gargantua*, *Ionocharis*, *leontoglossa*, *Mooreana*, *pachyantha*, *Peristeria*, *platyglossa*, *Reichenbachiana*, *velifera*.

2. *Cucullate*. Bracts large and cucullate, which distinguishes the included species from the preceding.

It includes *M. corniculata*, *M. cucullata*, *M. macrura*.

3. *Polyanthæ*. Peduncles few or many-flowered. Flowers generally but not always somewhat coriaceous, differing but little in shape from the preceding groups.

A somewhat polymorphous group, including *M. Ephippium*, *infracta*, *maculata*, *Schlimgenii*, *torarensis*.

4. *Coccinea*. Perianth scarlet, rose-purple, or yellow, sub-membranous, generally narrowly tubular below, lateral tails always short, or almost absent. Peduncles normally one-flowered, except in *M. racemosa*. A very natural group, easily recognised by the brilliant coloured perianth. All the included species and their hybrids are highly popular among cultivators.

This sub-section includes *M. amabilis*, *Barlaeanæ*, *coccinea*, *Davisiæ*, *igneæ*, *militaris*, *racemosa*, *rosea*, *Veitchiana*.

5. *Caudate*. Perianth membranous, the tubular portion generally short and open, with long slender tails, peduncles one-flowered. A large, varied, and easily recognised group.

Included species, *M. Arminii*, *caudata* (*Shuttleworthii*), *Estradae*, *hieroglyphica*, *ludibunda*, *triangularis*, *Wageneriana*.

6. *Amandæ* Flowers small, and borne in erect racemes, perianth membranous with short tails; in other characters much resembling the preceding group. The best known species included in it are *M. Melanopus* and *M. polysticta*.

II. SACCOLABIATÆ.* Lip saccate or cochlear, petals club-shaped, keeled and papillose near the apex; perianth tube short and open, generally more or less hairy. A most distinct section, including the species that are sometimes called by horticulturists the Chimæroid group.

It includes the following, *M. astuta*, *bella*, *Carderi*, *Chestertonii*, *Chimæra*, *Erythrochæte*, *Gaskelliana*, *Houtteana*, *nycterina*, *radiosa*, *Traglodytes*, *Vespertilio*.

III. TRIARISTELLE. Perianth tube extremely short; lateral sepals united almost or quite to apex; tails lateral, i.e., not a prolongation of

* Reichenbach uses Saccolabiatae in most places, but in one or two instances Saccolabiatae; as the latter compound is formed more in accordance with classical usage than the former, we have retained it in the text.

the sepals, but inserted below their apex on the lateral margin; peduncles slender, leaves small and narrow. A very natural group of exceptional interest, consisting of dwarf-tufted plants, bearing minute gem-like flowers.

The best known species in this section are *M. gemmata*, *triaristella* and *Tridactylites*.

IV. There is another section of the genus, of which *M. stertziifolia* and *M. gibberosa* are typical examples, but neither these nor the other included species known to us, with two or three exceptions, are of sufficient horticultural interest to require description in the following pages; the sectional characters are therefore omitted. One peculiarity possessed by this section may, however, be noticed, viz., that the flowers are inverted, the labellum and the lateral sepals are superior, and the dorsal sepal underneath them.

Geographical distribution.—The Masdevallias are alpine plants, which have their home on the mountains of tropical America, chiefly on that portion of the Andes that extends from Peru to the Isthmus of Panama, and their continuation through central America into the Mexican territory. One species has been introduced from the Organ Mountains, near Rio de Janeiro, and a few others are reported from the mountains of Brazil, two or three from the Roraima in British Guiana, and others from the coast range of Venezuela; but by far the greater number inhabit the Cordilleras on the west side of the continent. They first appear on the Peruvian Andes at about the fifteenth parallel of south latitude, from whence they are somewhat sparingly distributed along the mountains northwards for many hundreds of miles, sometimes occurring within the *Odontoglossum* zone, but usually at a higher elevation, and above the limits of the forest. North of the equator, from where the great chain of the Andes divides into three distinct branches or Cordilleras, as they are called, the Masdevallias follow chiefly the central one, gradually increasing in numbers till the fifth parallel is reached, where they appear to attain their greatest development—more than twenty-five species having been observed within a small compass in the vicinity of Sonson.* Northwards from Medelin they diminish rapidly in numbers on the central Cordillera; but on the eastern range from Sogamosa to Ocaña, some of the most brilliant-flowered species of the sub-section *Coccineæ* are abundant, and spread for miles over the higher slopes above the forest. Along the western Cordillera,

* The late M. Roezl in Godefroy's *Orchidophile*, June, 1883, p. 643.

from the latitude of Popayan northwards to Antioquia, the best known saccolabiate *Masdevallias* occur generally at a lower elevation than their congeners on the central and eastern ranges. North of the isthmus the species are more scattered. Several interesting forms occur in Costa Rica, thence northwards they become more rare, till within the Mexican territory they entirely disappear. The *Masdevallias* attain their highest vertical range near their southern limit in Peru, where they ascend to between 9,500 and 13,000 feet. In New Granada they occur at a lower elevation, their vertical range extending from 6,000 to 11,000 feet, and perhaps occasionally higher, some small-flowered species ascending to near the snow-line; near Sonson, which may be regarded as a *Masdevallia* "centre," their altitude is from 6,000 to 7,500 feet. North of the isthmus, as far as the Mexican frontier, the mountains and table-lands have a lower average elevation, and the vertical range of the *Masdevallias* is accordingly lower than in South America.*

In these elevated regions the *Masdevallias* live under climatic conditions different from those we experience in Great Britain, and which cannot be but imperfectly imitated in the glass structures in which they are cultivated in this country; nevertheless their culture is not attended with any special difficulties. The climate peculiar to their habitat is none the less eminently deserving of the attention of cultivators, the chief phenomena of which may thus be summarised:—At the great altitude at which the *Masdevallias* are found, especially towards their southern limit, the pressure of the atmosphere is so much diminished, that the air is not only much rarer but it is also much colder, and its capacity for absorbing moisture is also greatly diminished, but owing to local causes the saturation point is constantly being reached.† Now the average pressure of the atmosphere at sea-

* The region here sketched, and the localities mentioned, are contained in the maps illustrating the distribution of *Odontoglossum* and *Cattleya*, thence rendering the preparation of a special map for *Masdevallia* unnecessary.

† Atmospheric saturation at the altitude at which the Peruvian *Masdevallias* live, and in a somewhat less degree those of New Granada and the other localities named above, signifies something different from what it does at the proximity to sea-level at which they are cultivated in England. The quantity of moisture contained in a given quantity of air at an elevation of 12,000 feet is but a small part of what the same quantity of air is capable of containing at sea-level in the same latitude. Thus, at or near sea-level, "one cubic metre of air saturated with moisture at 25° C. (77° F.) contains 22·5 grammes of water, and if the temperature of the air be reduced to 0° C. (32° F.), it will then be capable of retaining only 5·4 grammes of water." (Roscoe, *Elementary Chemistry*, p. 51.) Or to express these facts in more popular language, a cubic yard of air at sea-level and at the temperature of 77° F. is capable of containing about five-sixths of an ounce of aqueous vapour, but the same quantity of air at the freezing point can only contain about one-fifth of an ounce. Hence at an altitude of 9,000—12,000 feet, where the density of the atmosphere is reduced to nearly one-half, the actual quantity of moisture held in suspension at any temperature is considerably less than at sea-level.

level is nearly fifteen pounds to the square inch, or equal to that of a column of mercury 30 inches high; but at 12,000 feet above sea-level, an altitude reached by several of the Masdevallias, the pressure is reduced to one-half, or to about $7\frac{1}{2}$ pounds to the square inch, and the mercurial column of the barometer stands no higher than 15 inches. By repeated observations the mean annual temperature at sea-level at the equator, and deviating but little from it for several degrees of latitude on either side, is found to be 27.5° C. (82° F.), but at an elevation of 12,000 feet in the same latitude it is only 7° C. (45° F.). At this elevation on the Andes of Peru, it has been observed that on clear days, the mean temperature at from one o'clock to three p.m. is nearly doubled, and at night the thermometer sinks to near the freezing point. The atmosphere is, however, constantly charged with moisture, caused by the vapours rising from the hot plains drenched by the equatorial rains on the eastern side of the mountains, and which are drifted thither by aerial currents, or attracted by the mountains themselves. In New Granada the climatic conditions of the *Odontoglossum* and *Masdevallia* zone are not very different from those of Peru, except that in consequence of the lower elevation, the atmospheric pressure is greater, and the mean temperature somewhat higher. Here on clear days the direct rays of a tropical sun cause oppressive heat, while its rapid radiation into space at night produces chilling cold; but both extremes are constantly being modified by the humidity of the atmosphere, scarcely a day passing on which this, at one time or other, is not at the saturation point. At Sonson, rain is frequent; almost every morning there is a dense fog, and on the neighbouring heights the temperature not infrequently sinks below zero (32° F.).* Generally, on the Cordilleras of New Granada and Venezuela, the rainy season lasts throughout the greater part of the year, owing to the immense quantity of aqueous vapour raised from the Atlantic Ocean being constantly blown towards them by the north-east trade wind.

Cultural Note.—The *Masdevallias* are usually cultivated in the "cool" house with *Odontoglossums*, *Oncids*, etc., but where they are made a speciality by amateurs or grown on a large scale by horticulturists, a separate house is assigned to them, in which they can be more efficiently treated according to their requirements, than when mixed with plants of other genera. When a separate house is so devoted to them, a lean-to with an east or north-east aspect should be preferred.

On their native mountains, the *Masdevallias* grow in a variety of situations—on the ground, in the crevices of rocks, on the trunks and branches of trees, and even on the roofs of buildings, but always where there is but little or no soil, or where there is but a small accumulation of

* Roezl in Godefroy's *Orchidophile*, 1883, p. 643.

vegetable matter; hence, as regards potting, *Masdevallias* should be treated as epiphytal orchids. They are, however, usually vigorous-rooting plants, and require room for the development of their roots, to allow for which pots of sufficient size should be used. The pots should be filled to two-thirds of their depth with a drainage consisting of clean broken crocks that have not been previously used for the same purpose, and the remaining third with a compost of sphagnum moss and fibrous peat in equal proportions; into this compost the roots should be carefully placed, the base of the plants being about on a level with the rim of the pot, or at least not much above it. The best seasons for re-potting *Masdevallias* are from the middle of January to the end of February, and from the beginning of October to the middle of November.

The temperature of the *Masdevallia* house should range throughout the year as near as practicable between 10° and 18° C. (50°—65° F.), the night temperature descending about 5° F. lower than the day. In sultry weather, such as sometimes occurs in July and August, when the external temperature is from 25° to 32° C. (77°—90° F.), the temperature of the house may be kept down by ventilation, by shading, and by keeping its atmosphere well charged with moisture by frequently watering the floors, stages and any surface from which water can readily evaporate. Generally, by regulating the shading, ventilation, and "damping down," as it is called by gardeners, during the summer, according to external circumstances, the temperature of the house may always be kept a few degrees lower than the external air.

In the humid climate in which the *Masdevallias* live naturally, their vegetation is at no period of the year interrupted, and hence, when transferred to glass houses in this country, a constant supply of water is one of their most essential requirements. This is usually afforded them in two ways—by maintaining a moist atmosphere in the house in the manner described above, and by direct application of water to the roots of the plants. The frequency with which the damping down should be done, and the quantity of water given at each watering, must be determined by the needs and condition of the plants, and according to the season of the year. Bearing in mind that *Masdevallias* must never be allowed to get dry at the roots, the cultivator will, by inspection of the plants, be better able to judge how much water should be given to them, and how often they require it, than by following any hard and fast rule. In winter, he may find that damping down once a day in the morning, and watering the roots once every four or five days will be sufficient, or less in time of severe frost, but even then the drying and exhausting effects of fire heat during prolonged cold weather must be counteracted by damping down and by watering the plants. As the season advances, it may be found necessary to damp down both in the morning and in the evening, and to water the plants once in three days or every alternate day; and in summer, damping

down three or four times a day and watering daily may not be found excessive.

And similarly with the ventilation and shading. From what is stated above, it will be readily inferred that the efficient use of both depends chiefly on, and is influenced by the external circumstances of weather; we prefer, therefore, to advise vigilance and a careful observation of these circumstances as they arise, than to attempt to frame any precise directions, which might possibly, if followed to the letter, partially or entirely defeat their own object. From their alpine character, most *Masdevallias* are naturally light-loving plants; the small dwarf species may therefore, with advantage, be always suspended near the roof-glass of the house in which they are cultivated.

The general cultural treatment here sketched is applicable to the majority of the *Masdevallias*, but a few exceptions have to be noted:—*Masdevallia tovarensis* and the species included in the section SACCOLABIAE, *M. Chimera* and its allies, occur at a lower elevation than the other species, and where the mean temperature is higher. These plants during the winter months are best stationed either in the coolest part of the *Cattleya* house or in the intermediate house, where they will receive as much light and air as circumstances admit; during the summer they may be removed to the cool house. It is a peculiarity of most saccolabiate *Masdevallias*, that their flower stalks grow downwards, like those of a *Stanhopea*; they should therefore be put into shallow baskets made of teak rods placed sufficiently wide apart to allow the egress of the flower stalks, and which may be easily suspended near the roof-glass of the house. No crocks are required for drainage, but peat and sphagnum only to root in, which must be kept constantly moist. These *Masdevallias* are very liable to the attacks of thrip, which can be kept under by washing with a solution of soft-soap.

SYNOPSIS OF SPECIES AND VARIETIES.

Masdevallia amabilis.

Leaves narrowly oblanceolate, acute, 4—6 inches long, leathery. Scapes slender, erect, as long again as the leaves, one-flowered. Flowers about an inch broad across the lateral sepals, brightly coloured; perianth tube narrow, bent, orange-yellow longitudinally veined with red; free portion of upper sepal oval, orange-yellow, sometimes deep rose with five red veins and contracted to a dull red tail 1½—2 inches long; lateral sepals connate to more than half their length, oval-oblong, gradually contracted to slender parallel tails, 1—1½ inches long, orange-yellow densely studded with crimson papillæ, and with three crimson-purple veins; petals and lip oblong, whitish, the former with one, the latter with several red longitudinal streaks.

Masdevallia amabilis, Rchb. in Bonpl. II. p. 116 (1854). Id. Walp. Ann. VI. p. 193. *Illus. hort.* n. s. t. 196 (*var. lineata*).

First discovered in 1850 by Warscewicz, on the Andes of northern Peru, but not introduced into European gardens till 1872, when it was re-discovered in the same region by Roezl. Its brilliant-coloured flowers bring it under our sub-section *Coccineæ*, its nearest allies being *Masdevallia Barlaiana* and *M. Veitchiana*.



Masdevallia amabilis.

M. Arminii.

Leaves oblong-lanceolate, $1\frac{1}{2}$ inches long, narrowed below into a somewhat slender petiole as long as the blade. Scapes slender, longer than the leaves, one-flowered. Perianth tube short, whitish; free portion of sepals crimson-purple, the dorsal one sub-orbicular, concave; the lateral two broadly oval-oblong, nearly flat, and contracted to filiform, yellowish tails 1—2 inches long. Petals linear-oblong, toothed at the apex, white; lip oblong, reflexed at the tip, where there is a blackish purple warty blotch.

Masdevallia Arminii, Rehb. in Bonpl. II. p. 283 (1854). Id. Gard. Chron. XVIII. (1882), p. 102.

First discovered on the eastern Cordillera of New Granada, in the Pamplona district, more than thirty years ago, by Schlim, but dedi-

cated by the late Professor Reichenbach to his friend Hermann Wagener, by latinising the Christian name. It appears to have been first introduced into European gardens by Messrs. Sander and Co., of St. Albans, in 1882.

M. astuta.

Leaves linear-ob lanceolate, acute, complicate at base, 8—10 inches long. Scapes longer than the leaves, first decumbent, then ascending, 3—5 or more flowered, the flowers developed in acropetalous order, that is, successively along the rachis from pedicels springing from the base of the ovary of the next older. Sepals triangular, keeled behind, connate at the base to about one-third of their length, and forming a very short campanulate tube, pubescent on the inner side, cream-white densely spotted with red; tails $2\frac{1}{2}$ inches long, reddish purple, paler towards the tip; petals linear-oblong, with a hairy wart at the reflexed tip, white stained with purple; lip with a long bent claw that is fleshy upwards, and has a deep incision in the upper side; blade saccate with toothed margin and three raised longitudinal plates within, white with a slight reddish tint. Column beaked.

Masdevallia astuta, Rehb. in Gard. Chron. XXVI. (1886), p. 584.

A recent addition to the saccobaliate section, having for its nearest allies *Masdevallia Erythrochate* and *M. Gaskelliana*, connecting these with *M. Chimæra*. It was discovered by Carder, in Costa Rica, and introduced by Messrs. Shuttleworth and Carder, of the Park Road Nursery, Clapham, in 1886. As a species it is one of the handsomest of the group to which it belongs.

M. Barlaeanæ.

Plant dwarf and tufted, with elliptic-lanceolate leaves 4 inches long including petiole. Scapes as long again as the leaves, slender, erect, with two appressed membranous bracts, one-flowered. Perianth tube narrow, slightly bent, prominently keeled and coral-red above, pinkish beneath; free portion of upper sepal small, sub-quadrata, orange-yellow with a median and marginal red lines, and contracted to a filiform red tail $1\frac{1}{2}$ inches long; the lateral two elliptic-oblong, connate to two-thirds of their length, and terminating in long points which cross each other, bright carmine shaded with scarlet and with three sunk crimson lines; petals and lip minute, oblong, white, the latter with a purple spot at the tip.

Masdevallia Barlaeanæ, Rehb. in Gard. Chron. V. (1876), p. 170.

A species with medium-sized but brilliantly coloured flowers, allied to *Masdevallia amabilis*, from which it may be distinguished by the two lateral sepals being more divergent, by the broader and

shorter triangular sinus between them, and by their tails not being parallel. It was discovered by Walter Davis on the Andes of Peru, near Cuzco, and introduced by us in 1875. It was dedicated to Senhor J. B. Barla, at that time the Brazilian Consul at Nice, "well known for his orchidologic works, as well as for his special knowledge of the Floras of Liguria and Sardinia."

M. bella.

Leaves oblong-lanceolate, obtuse, 5—7 inches long. Scapes pendulous, dull purple with an appressed bract at each joint and at the base of the ovary; ovary short, angular, blackish purple. Flowers solitary, large and open, of triangular shape; the sepals pale yellow spotted with brownish crimson, the spots denser on the upper sepal, rarer on the lateral two and chiefly aggregated towards the outer margin; upper sepal triangular, contracted into a long, slender, reddish brown tail, 3—4 inches long; lateral sepals larger, sub-rhomboidal, connate to beyond the middle, and contracted into long slender tails like the upper one; petals small, obovate, emarginate, yellow spotted with red; lip with a short fleshy claw and concave, shell-like blade, in the hollow of which are numerous raised lines radiating from the claw. Column very small.

Masdevallia bella, Rehb. in *Gard. Chron.* IX. (1878), p. 725. *Id. XIII.* (1880), p. 756, icon. xyl. *Fl. Mag.* n. s. t. 433. *Belg. hort.* XXXIV. (1884), p. 57.

A curious and remarkable species allied to and much resembling *Masdevallia Chimæra*, but easily distinguished from it by its large shell-like labellum. It was discovered by the late Gustav Wallis while collecting for us in New Granada in 1873—4, but who failed to send home living plants. It was introduced four years later by Messrs. Low and Co., of Clapton. Its habitat is in the Frontino district, near Antioquia, on the western Cordillera, at 5,000—7,000 feet elevation, where it grows under the same conditions as *M. Chimæra*, and sometimes even mixed with it.

M. calura.

Leaves oblanceolate, 3 inches long, leathery and distinctly stalked. Scapes as long as the leaves, one-flowered. Flowers deep chocolate-red with a blackish shade; perianth tube cylindric, bent; free portion of upper sepal triangular, prolonged into a filiform, orange-yellow tail 1½—2 inches long; connate lateral sepals oval-oblong, reflexed, minutely papillose on the inner side, with a small triangular sinus between the tails, which are parallel and orange-yellow; petals linear-oblong; lip sub-rhomboidal. Column white.

Masdevallia calura, Rehb. in *Gard. Chron.* XX. (1883), p. 230.



Masdevallia bella.



Masdevallia Chimæra.
(See page 90.)

A species introduced by Messrs. Sander and Co. from Costa Rica, where it is said to be associated with *Masdevallia Richenbachiana*. Its deep chocolate flowers with bright yellow tails render it distinct among the small-flowered Masdevallias. The specific name is from καλὸς (kalos), "beautiful," and οὐρά (oura), "a tail." *

M. campyloglossa.

Leaves linear-oblong, petiolate, obtuse, 3 inches long, very leathery. Peduncles slender, shorter than the leaves, one-flowered. Flowers about an inch across; perianth tube very short; sepals spreading, triangular, acuminate, dull white with some purple spots at the margin, and three purple veins; petals oblong, mucronate, white; lip longer than the petals, linear-oblong, slightly tapering, bent, obscurely pubescent, white with a purple median line, and a shorter one on each side of it.

Masdevallia campyloglossa, Rchb. in Gard. Chron. X. (1878), p. 588.

Acquired by us amongst other orchids at Stevens' Rooms in 1878, no information being given respecting its origin. As it is still in cultivation in several collections it could not be passed over in this place. Its specific name refers to its bent labellum, from κάμπυλος (kampulos), "bent," and γλῶσσα (glossa), tongue—in orchidology, "lip."

M. Carderi.

Leaves spathulate-lanceolate, 3—5 inches long. Scapes slender, pendulous, with 2—3 appressed membranous bracts, shorter than the leaves, one-flowered. Flowers campanulate, French-white, blotched externally around and near the base of the connate sepals with brown-purple, the inner surface covered with short hairs, and spotted with brown-purple at the base; sepaline tails equidistant, 2 inches long, pale yellow, sometimes spotted with brown-purple; petals linear-oblong, reflexed at the tip, white with a purplish brown mid-line; lip sub-panduriform in outline, the basal half (hypochile) with a longitudinal cleft, the distal half (epichile) shell-like, smooth on the inside.

Masdevallia Carderi, Rchb. in Gard. Chron. XIX. (1883), p. 784. Id. XX. p. 181, icon. xyl.

Introduced by Messrs. Shuttleworth and Carder in 1883, and named after the junior partner of the firm, for many years a collector of orchids in tropical America, and who discovered this pretty *Masdevallia* on the slopes of the western Cordillera of New Granada, near Frontino.

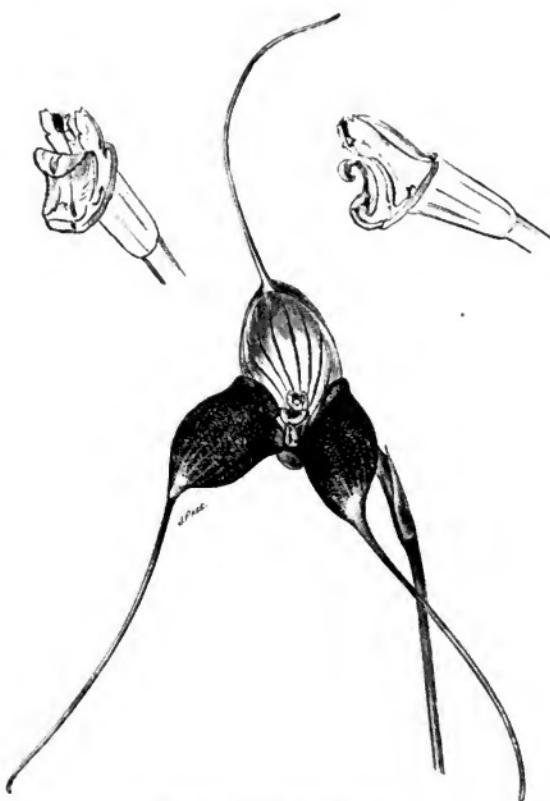
* The specific name is thence a substantive name, and if we interpret rightly Art. 34 of the *Laws of Botanical Nomenclature*, it should take a capital letter, but following custom, we leave it as it is. So also *campyloglossa*, *leontoglossa*, *macrura*, etc.

M. caudata.

Foliis obovato-oblongis, scapo paulo brevioribus, sepalis longissime aristato-caudatis. Hab. in subfrigidis regni Novogranatensis prope S. Fortunato, florens Junio. (Lindl. Gen. et Sp. Orch. p. 193.)

var.—**Shuttleworthii.**

Leaves obovate-oblong, often elliptic-oblong, 2—3 inches long, narrowed to a slender petiole of about the same length. Scapes equaling or longer than the leaves, with 1—2 acuminate, appressed bracts, one-



Masdevallia caudata Shuttleworthii.

flowered. Flowers 1—1½ inches across, exclusive of the sepalline tails perianth tube short, campanulate gibbous below; upper sepal obovate, concave, light yellow spotted with red and with 5—7 red veins

lateral sepals obliquely ovate, mauve-purple mottled with white; tails yellow, 2—3 inches long; petals linear-oblong, white; lip broadly oblong, reflexed at tip, pale mauve.

M. caudata Shuttleworthii, Rchb. in Gard. Chron. V. s. 3. (1889), p. 200.*
M. Shuttleworthii, Rchb. in Gard. Chron. III. (1875), p. 170. Bot. Mag. t. 6372.
Williams' Orch. Alb. I. t. 5. Sander's Reichenbachia I. t. 13.

var.—*xanthocorys*.

Flowers smaller than in the variety *Shuttleworthii*, with the sepals a little broader at the base, the upper sepal pale yellow with thin brownish red, dotted veins, the lateral sepals pale yellow sometimes faintly tinted and spotted with rose.

M. caudata *xanthocorys*, supra. M. Shuttleworthii *xanthocorys*, Rchb. in Gard. Chron. XVII. (1882), p. 366.

Masdevallia crudata was one of the first species of the genus that became known to science, a dried specimen having been received by Dr. Lindley in 1831, or even earlier. It remained unknown to horticulture till it was re-discovered by Mr. Shuttleworth in 1874, between Agua Larga and Fusngassinga in New Granada, while collecting orchids for Mr. William Bull, of Chelsea, by whom it was introduced. It has also been detected in the *Odontoglossum crispum* district, near Pacho, growing on the trunks of trees at 6,500—8,000 feet elevation. The variety *xanthocorys* first appeared in the collection of Sir Trevor Lawrence, Bart., at Bursford Lodge, near Dorking, in 1882.

M. Chestertonii.

Leaves narrowly oblanceolate, sub-acute, 5—7 inches long, leathery. Scapes as long as the leaves, pendulous, one-flowered. Sepals ovate-oblong, keeled behind, with abrupt slender tails an inch long, the blade greenish yellow spotted with blackish purple; petals minute, oblong, yellowish red with an apical black tumour; lip large, with a grooved claw and transversely reniform, concave blade, pale orange-yellow with numerous radiating raised reddish lines. Column terete, arched, white with a few brownish red spots near the apex.

Masdevallia Chestertonii, Rchb. in Gard. Chron. XIX. (1883), p. 532. Bot. Mag. t. 6977.

* The typical *Masdevallia caudata* is but poorly represented in British herbaria, but enough of it remains to remove any doubts as to the propriety of referring Reichenbach's *M. Shuttleworthii* to that species. The late Professor himself also arrived at this conclusion, and gave expression to his belief in the article quoted above, but adopting the unusual course of affixing a varietal name to the form which he considered to be the type. There is, however, still some uncertainty whether *M. caudata* (Lindl.) and *M. Shuttleworthii* (Rchb.) are simply identical, or whether the latter is a variety of the former; until this uncertainty can be cleared up, it appears to us that the safest course is to leave them for the present as they are described in the text.

A very curious species, one of the saccoblaste group, with flowers about the size of those of *Masdevallia nycterina*. It was the last discovery of Chesterton while collecting orchids for Messrs. Sander and Co., in the New Granadian province of Antioquia, a short time previous to his death, in 1883. It is well distinguished by its large, pale red, elaborately sculptured lip with a grooved claw, in which it approaches *M. bella*, but differs from it in the colour both of this organ and of the sepals.

M. Chimæra.

Leaves narrowly oblanceolate, 6—9 inches long, narrowed below into a complicate foot-stalk, invested with membranous sheaths at the base. Scapes slender, 12—15 (or more) inches long,* pushing first downwards and then upwards, but sometimes erect, jointed with a small pale green appressed sheath at each joint, 3—5 or more flowered. Flowers produced singly by successive prolongations of the scape from the joint immediately below the ovary, and issuing from the sheathing bract; very variable in size and colour,† but with the following constant characters:—Perianth tube broadly campanulate, very short; sepals broadly ovate, acuminate, keeled behind, prolonged into slender tails 3—4 inches long, the lateral two connate to about one-half of their length, forming at the suture a deep boat-shaped depression, all more or less pubescent on the inner side and covered with warty spots; petals spatulate, expanded at the tip, into lobes, on which is a blackish purple spot; lip saccate, clawed, the claw (hypochile) fleshy with a broad oval cleft above, the blade (epichile) concave with three parallel or very slightly divergent raised longitudinal lines and with numerous smaller ribs radiating from the outside two to the toothed margin. Column terete, bent at the apex, usually yellow above and white beneath.

Masdevallia Chimæra, Rchb. in *Gard. Chron.* 1872, p. 463. Id. in *Linnaea* XLI. p. 8 (1877). *Xen. Orch.* II. p. 195, t. 185 and t. 186, fig. 1. *Gard. Chron.* IV. (1875), p. 258. Id. XIV. (1881), p. 113. Williams' *Orch. Alb.* V. t. 203.

var.—*Backhouseana*.

Flowers among the largest, with shorter tails and hispid pubescence; ground colour of sepals light yellow with cinnamon-red warty spots somewhat sparingly scattered over the central area of each sepal; tails reddish brown; lip white.

M. Chimæra *Backhouseana*, supra. M. *Backhouseana* in *Gard. Chron.* XI. (1879), p. 716. Sander's *Reichenbachia* I. t. 19.

* Roezl, the discoverer of the species, states that the plants detected by him near Choco bore flower scapes 2 feet long; a variety collected by Kalbreyer, near the upper limits of its vertical range, had erect scapes little more than 6 inches long.

† The polymorphy of *Masdevallia Chimæra* was first observed by Gustav Wallis, *Gard. Chron.* IV (1875), p. 258.

var.—Gorgona.

Sepals very hairy, the ground colour canary-yellow densely spotted with deep red-purple except towards the inner margin of the lateral two where the spots are more scattered, and at the base of the upper one where they are replaced by purple dots; lip tinged with pale orange-red.

M. Chimæra Gorgona, supra. M. Gorgona, Hort.

var.—Roezlii.

Sepaline spots blackish and very densely placed, leaving but small traces of the pale ground colour, pubescence very close; lip with a somewhat broader and shorter epichile than in other forms, white or faintly tinted with rose, the raised lines within the sac bright rose.*

M. Chimæra Roezlii. supra. M. Roezlii, Rehb. Xen. Orch. II. p. 196, t. 186, fig. 2.

sub-var.—rubra (Williams' *Orch. Alb.* VI. t. 243), spots chocolate-red and not so dense as in the type.

var.—senilis.

Flowers among the smallest of the *Masdevallia Chimæra* forms; the pubescence on the inner surface of sepals long and whitish, the spots blackish red on a pale yellow ground; lip white with an orange spot within the sac on the basal side

M. Chimæra senilis, supra. M. senilis, Rehb. in Gard. Chron. XXIV. (1885), p. 489.

var.—severa.

Peduncles erect or sub-erect, shorter, and bearing smaller flowers than the typical form; sepals narrower and more acuminate, pale yellow densely spotted with chocolate-red, pubescence close.

M. Chimæra severa, supra. M. severa, Rehb. in Gard. Chron. III. (1875), p. 170.

var.—Wallisii.

Sepals with hispid pubescence, whitish or pale yellow more or less covered with brown-purple warty spots; tails red-purple; lip white sometimes yellowish within the sac.

M. Chimæra Wallisii, supra. M. Wallisii, Rehb. in Gard. Chron. IV. (1875), p. 258. Id. XXIII. (1885), p. 270 (stupenda). M. Chimæra, Bot. Mag. t. 6152. *Revue hort.* 1881, p. 130. Fl. Mag. n. s. t. 149.

var.—Winniana.

Flowers large; sepals elongated and more acuminate than in the variety *Roezlii* which it closely approaches, and with the tails more slender; pubescence very close, spots dense and blackish; at the base of the upper sepal is a yellow transverse band dotted with purple.

M. Chimæra Winniana, supra. M. Winniana, Rehb. in Gard. Chron. XVI. (1881), p. 198.

* One of the characters relied on by Reichenbach to distinguish this form specifically from his *Masdevallia Chimæra* was the entire edge of the saccate limb of the lip, but we have failed to detect this peculiarity in any of the plants seen by us in cultivation under the name of *M. Roezlii*; in fact, in all the forms we have examined, the margin is more or less denticulate.

This grotesque and striking *Masdevallia* was discovered in 1871 by M. Roezl at Choco, on the Western Cordillera of New Granada,* but he failed to send living plants to Europe at the time. It was, however, introduced shortly afterwards by M. Linden, through Gustav Wallis, who had detected it at Frontino, near Antioquia, mixed with *Masdevallia nycterina*, as the two were sent to M. Linden together, and both were distributed in the first instance under the name of *M. Chimæra*.† The form introduced through Wallis was afterwards found to differ somewhat from Roezl's discovery, and subsequently received the name of *M. Wallisii*, a circumstance which led to much confusion in the nomenclature and identification of both these and other forms.‡ The variety *Backhouseana* was introduced by the firm whose name it bears through their collector, Butler, who found it near Frontino.§ *Roezlii* was introduced by Messrs. Sander and Co., of St. Albans, in 1881; *severa* by Mr. Bull, through Shuttleworth; *senilis* by Messrs. Low and Co.; *Winnianus* first appeared in the collection of Mr. Charles Winn, at the Uplands, Sely Hill, Birmingham, a collection exceptionally rich in *Chimæra* varieties.||

The habitat of *Masdevallia Chimæra* is restricted to a comparatively small area on the western Cordillera of New Granada, extending from Frontino, near Antioquia, to a few miles southward of that town. Its vertical range is from 4,500—6,500 feet; it grows chiefly on trees and shrubs, preferring the forks of the branches where there is a small accumulation of decaying vegetable matter, and where there is shade and moisture. In those localities in which *M. Chimæra* is most abundant the atmosphere is always at or near the saturation point, and fogs and mists are almost of daily occurrence for more than nine months of the year; but at the higher limits of its range, where these hygrometric conditions are less pronounced, the plants are much less vigorous, but flower

* Gard. Chron. IV. (1875), p. 233.

† Gard. Chron. 1873, p. 1238.

‡ Gard. Chron. II. (1874), p. 804. Id. III. (1875), p. 40. Id. IV. p. 258.

§ Sander's Reichenbachia, I. sub. t. 19.

|| Besides the varieties described above there are other *Chimæra* forms in cultivation, named and unnamed, so intermediate in character between these varieties that they may with equal right be referred to either of the two between which they stand; the probability is also extremely great that other forms exist in the native habitat of the species, sufficient in number to connect the whole into a confluent series.

more freely; the leaves are smaller and more leathery, the flower scapes shorter and erect, and the flowers are smaller in all their parts.*

The name *Chimæra* is mythological, but although a very fanciful one for plant nomenclature, its application to this species is justified by the singular appearance of the flowers.†

M. *civilis*.

Leaves linear-oblong, sub-acute, 5—6 inches long. Scapes very short, mottled blackish purple, with a sheathing bract below the short, bent, furrowed ovary, one-flowered. Flowers coriaceous, with a smooth polished surface externally, and emitting a faint fetid odour; perianth tube cylindric, gibbous below at the base, greenish yellow externally, internally deep purple at the base, above which it is spotted; free portion of sepals triangular, prolonged into short recurved tails, greenish yellow; petals sub-spathulate, acute, white with a deep purple sunk mid-line on the inner side, keeled behind; lip oblong, reflexed at apex, channelled above, mottled and dotted with purple. Column stoutish, semi-terete, winged on the inside, greenish above, purple below the stigmatic hollow.

Masdevallia civilis, Rchb. in Bonpl. II. (1854), p. 115. *Bot. Mag.* t. 5476.

Discovered by Warscewicz in Peru, in 1852—3. It was first cultivated in Europe by Consul Schiller, at Hamburg, by whom it was communicated to Sir William J. Hooker, at Kew. The specific name, *civilis*, "relating to citizens or the state," is peculiar, and of which we have seen no explanation respecting its application to this plant. We are indebted to Mr. F. W. Moore, of the Royal Botanic Garden at Glasnevin, for materials for description.

M. *coccinea*.

Leaves obovate-lanceolate, 6—9 inches long, narrowed below into long petioles. Scapes 12 or more inches long, slightly flexuose, with 3—4 distant joints, at each of which is an appressed spotted sheath. Flowers solitary, magenta-purple in the first introduced form and with the base of the tube white; perianth tube compressed, bent, slightly gibbous below; upper sepal linear, with a triangular base, flexuose above;

* The difference in the size of the leaves and the length of their foot-stalks, noticeable in imported plants, often disappears more or less under cultivation, thence showing that the smaller-leaved forms from the higher limits of the vertical range of the species are but climatic variations.

† The Chimæra of mythology was a monster, the offspring of Typhon and Echidna, that breathed flames of fire; it had the head of a lion, the body of a goat, and the tail of a dragon. After ravaging Lycia and the surrounding countries, it was killed by the hero Bellerophon, who, having obtained possession of the winged horse Pegasus, rose with it into the air and slew the Chimæra with his arrows.

lateral sepals connate to about one-third of their length, semi-ovate, oblique, tapering to approximate tips; petals and lip included in the tube, the former linear-oblong, auricled at the base on the front side, the latter tongue-shaped, cordate at base.

Masdevallia coccinea, Linden ex. Lindl. *Orch. Lind.* p. 5 (1846). *Gard. Chron.* 1868, p. 75. Rehb. *Xen. Orch. I.* p. 197, t. 74. *M. Lindenii*, André in *Illus. hort.* 1870, p. 226, t. 42. *Fl. Mag.* n. s. I. t. 28. Jennings' *Orch.* t. 17.

var.—*conchiflora*.

Flowers larger, with the lateral sepals broader, more rotund, concave, or shell-like; in colour like the first introduced form.

M. coccinea conchiflora, supra. *M. Harryana conchiflora*, Hort. Bull.

var.—*Harryana*.

Flowers variable in size and colour, and distinguished from the typical *Masdevallia coccinea* chiefly by the two lateral sepals that are dilated into broad oval-falcate blades, terminating in acuminate tips which are turned towards each other, the two forming an almost orbicular body, varying in size from $1\frac{1}{2}$ to 3 inches in diameter, and in colour from deep sanguineous purple to pale yellow or milk-white; sepaline tube orange-yellow.

M. coccinea Harryana, supra. *M. Harryana*, Rehb. in *Gard. Chron.* 1871, p. 1421. *Fl. Mag.* 1871, t. 555. *Fl. and Pomol.* 1873, p. 169. *Belg. hort.* 1873, t. 21. Van Houtte's *Fl. des Serres*, XXI. t. 2250. *M. Lindenii Harryana*, *Illus. hort.* 1873, p. 167, t. 142. *Bot. Mag.* t. 5990 (*Lindenii*).

sub-vars.—*armeniaca* (Williams' *Orch. Alb.* V. t. 224), deep apricot-yellow with red veins; *atrosanguinea* (*Id. III.* t. 105), deep crimson-purple; *ceruleescens* (*Id. I.* t. 21), magenta-crimson toned with bluish purple; *decora* (*Id. VIII.* t. 344), light magenta-purple with deeper veins; *Denisonii* (*Fl. Mag.* n. s. 1873, t. 79), syn. *Bull's blood*, deep sanguineous purple; *lutea* (*Gard. Chron.* XI. (1879), p. 716), rosy purple; *miniata* (Williams' *Orch. Alb.* III. t. 110), vermillion-red with crimson veins; *luteritia* (Hort.), brilliant magenta-purple; *tricolor* (Hort.), magenta-crimson, striped with maroon; *versicolor* (*Gard. Chron.* XVI. (1881), p. 306), deep magenta-crimson veined and shaded with purple-crimson, carmine, and rose, etc., etc.

Masdevallia coccinea was first discovered in 1842—3 "on the southern slopes of the high mountains near Pamplona, at 9,500 feet elevation," by Linden, from whose herbarium specimen, now preserved at Kew, it was described by Dr. Lindley in the work quoted above. It subsequently became confused with *M. militaris*, discovered some years later by Warscewicz, from whom Dr. Lindley received dried flowers and a coloured drawing which he affixed, in error, to Linden's type specimen. Still later the name became mixed up with *M. ignea*, both in British and continental collections,

and forms of *M. militaris* and *M. ignea* have been cultivated under the name of *M. coccinea*. The typical *M. coccinea* was introduced in 1869, in which year it was re-discovered by Gustav Wallis and sent by him to M. Linden, in whose horticultural establishment, at Ghent, it flowered for the first time in Europe in June in the following year, when it was described by M. André, and figured in the *Illustration Horticole* under the name of *M. Lindenii*. It is abundant on the rocks along the western slopes of the eastern Cordillera of New Granada, near Pamplona, at a great elevation, where it is associated with the small-flowered, unattractive *M. octodes*, which is



Masdevallia coccinea Harryana.

also very abundant. The variety *conchiflora*, which is very distinct in form but in colour agreeing with the first-introduced form, appeared some years ago in Mr. Bull's horticultural establishment, at Chelsea. Far superior both to the type and to the variety *conchiflora*, from a horticultural point of view, is the variety *Harryana*; this superiority is due to its great variability in colour, which in all the cultivated forms is characterised by great brilliancy, and to a less extent,

in form, and also to the improvement to which it is susceptible under cultivation; these causes have tended to render this *Masdevallia* one of the most popular in cultivation, as is amply testified by the numerous illustrations of it quoted in page 34.* It was discovered by Chesterton, in 1871, near Sogamosa, and was introduced by us in the same year. Its principal locality is on the eastern Cordillera, between Sogamosa and Concepcion, where its vertical range is 7,000—10,000 feet; it is particularly abundant on that part of the Cordillera called the Sierra Nevada de Chita, where it spreads in uninterrupted masses for miles, covering acres upon acres of the upland slopes, growing in the partial shade afforded by the low shrubs that abound in the place. When in bloom these masses of *Masdevallia* present one of the most striking floral sights it is possible to behold, even in tropical lands; it is not only the dazzling brilliancy of the colours displayed by the countless thousands of flowers, but also their astonishing variety; there is scarcely a shade of colour from the deep rich crimson-purple of *Bull's Blood*, through magenta-crimson, crimson-scarlet, scarlet, orange, yellow, to cream-white that is not represented in greater or less abundance, the lighter shades of yellow being the rarest. In the lower limits of its range the leaves are longer, narrower and deeper in colour, the plants less floriferous, the flowers somewhat smaller and of a uniform colour, merging into that of the form known in gardens as *M. Lindenii*, which always occupies the lower zone of the vertical range of the species. On ascending towards the higher limits the foliage becomes dwarfer and paler in colour, and the flowers larger and more variable in colour; it is only at and near the upper limit that the pale yellow and white varieties occur.

M. coriacea.

Leaves linear-lanceolate, very coriaceous, almost fleshy, 5—7 inches long, deep green with a sunk mid-line above, pale green and obscurely keeled beneath. Scapes as long as, sometimes shorter than the leaves, pale green dotted with dull purple, with an appressed bract at the joint below the ovary, one-flowered. Perianth tube broadly cylindric, whitish yellow with some purple dots along the veins; free portion of upper

* The fine specimens of many of the *Harryana* varieties in the collection of Sir Trevor Lawrence, Bart., M.P., at Burford Lodge, Dorking, are the admiration of all who have had the privilege of seeing them.

sepal triangular, keeled above, coloured like the perianth tube, and prolonged into a short broad tail; lateral sepals oblong, yellowish, prolonged into acuminate points; petals oblong, white with a purple mid-line; lip tongue-shaped, reflexed, hairy above, greenish yellow, with purple mid-line and margined dots.

Masdevallia coriacea, Lindl. in Ann. and Mag. Nat. Hist. XV. (1845), p. 257.
Rehb. in Gard. Chron. 1872, p. 1067. M. Brückmulleri, Hort. Low.

Discovered in 1842 on the eastern Cordillera of New Granada, near Bogota, by Hartweg, from whose herbarium specimens it was named and described by Dr. Lindley; it was afterwards found by Linden, Schlim and Weir in the neighbourhood of the same city, where it occurs on fully exposed slopes high up on the Cordillera, but all these collectors failed to send living plants to Europe. It was first imported alive by Messrs. Low and Co. in 1871, and was distributed by them under the name of *Masdevallia Brückmulleri*, in compliment to the collector who sent it to them, it being supposed at the time to be a new species. The specific name, *coriacea*, "leathery," refers to the texture of the flowers.

M. corniculata.

Leaves oblong-lanceolate, 6 inches long, including petiole. Scapes half as long as the leaves, one-flowered, with a large, pale green, prominently keeled, ovate, acuminate bract embracing the ovary and base of perianth tube. Flowers brownish red, mottled with pale yellow; perianth tube broadly cylindric, bent, gibbous below; free portion of upper sepal shortly triangular, suddenly contracted into a slender tail 2 inches long; lateral sepals nearly oblong, reflexed, contracted into slender tails that are shorter than the upper one and which point straight downwards; petals ligulate, longer than the column, white with yellow tips; lip sub-pandurate, papillose at the apex, yellowish spotted with purple, as is the short column.

Masdevallia corniculata, Rehb. in Gard. Chron. IX. (1878), p. 72

var.—*inflata*.

Flowers somewhat larger, with the perianth tube more inflated, light orange-yellow mottled with brown, paler beneath; tails bright yellow.

M. corniculata inflata, supra. *M. inflata*, Rehb. in Gard. Chron. XVI. (1881), p. 716.

Introduced by Messrs. Backhouse from New Granada, in 1877, and subsequently imported by other horticultural firms. The variety *inflata* first appeared in Mr. Bull's collection in 1881. This species and the next are well distinguished by the large hood-like bract that sheathes the base of the perianth tube.

M. cucullata.

Leaves oblong-lanceolate, 9—12 inches long, very leathery. Scapes as long as the leaves, with a sheathing bract near the base, and a larger one embracing the ovary and base of sepalline tube. Tube sub-cylindric, with a double gibbosity below; free portion of sepals triangular, keeled, deep maroon-purple; tails $1\frac{1}{2}$ inches long, yellowish green; petals white, oblong, contracted at the tip where there is a blackish purple wart; lip tongue-shaped, deep purple.

Masdevallia cucullata, Lindl. Orch. Lind. p. 4 (1846). Rehb. in Gard. Chron. XIX. (1883), p. 592.

Discovered by Linden, in the forests of Fusagassuga, near Bogota, in New Granada, in 1842, and afterwards gathered by Wallis, Roezl, and others, but not introduced till 1883, when the first plants that reached Europe alive were collected by Carder, for the firm of Messrs. Shuttleworth and Co., in the locality in which the species had been discovered by Linden forty years previously. *Masdevallia cucullata* is known in its native country by the name of *La Viuda*, "the widow,"* which it probably obtained on account of its sombre-coloured flowers that are hooded by a conspicuous bract, the latter character also suggesting the scientific name.

M. Davisii.

Leaves 6—8 inches long, narrowly oblanceolate, thick and leathery. Scapes slender, longer than the leaves, one-flowered. Flowers $1\frac{1}{2}$ —2 inches broad across the lateral sepals, yellow with some orange markings at the base externally; perianth tube sub-cylindric, with a prominent keel above and gibbous beneath at the base; free portion of upper sepal ovate-triangular, ascending, gradually contracted into a slender tail an inch long; lateral sepals oblong, connate to more than half their length, contracted at the apex into slender cusps; petals and lip very small and concealed within the tube, the former oblong, notched at the top, auricled at the base, white, the latter clawed, linear-oblong, brownish. Column semi-terete, toothed at apex.

Masdevallia Davisii, Rehb. in Gard. Chron. II. (1874), p. 710. Id. V. (1876), p. 366. Xen. Orch. III. p. 3. t. 203. Bot. Mag. t. 6190. Williams' Orch. Abb. II. t. 76.

Discovered in 1873 by our collector, Davis, on the eastern Cordillera of Peru, at no great distance from the historic city of Cuzco. It occurs on the slopes of the mountains at an immense elevation, probably not less than 10,500—12,000 feet, growing in loam and moss, and also in decaying vegetable matter collected in the crevices

* Roezl affirms that this name is applied to *Masdevallia macrura* by all the children in the neighbourhood of Sonson. Godefroy's *Orchidophile*, 1883, p. 643.

of the rocks. Its geographical range appears to be very restricted, extending but a few miles along the flanks of the mountain within the vertical limits stated above, but where, however, plants were seen in all stages of growth, from the smallest seedlings to masses of considerable size. Like most of the species with brilliant-coloured flowers (sub-section *Coccineæ*), *Masdevallia Davisii* varies in the size of its flowers, and in the shade of their colouring which ranges from rich orange-yellow to light primrose.



Masdevallia Davisii.

M. demissa.

Leaves very leathery, spatulate-cuneate, 6 inches long, tridentate at apex, narrowed below into a channelled petiole. Scapes shorter than the leaves, with a lax, membranous bract below the short, bent ovary. Perianth tube half an inch long, funnel-shaped, yellow with three red-brown lines above, deep red-brown below; free portion of upper sepal yellow, triangular at the base, prolonged at apex into a slender

tail an inch long: lateral sepals connate to three-fourths of their length, ovate-oblong, deep red-brown with yellowish veins; tails orange-yellow; petals, lip and column minute and concealed within the tube; the petals and lip oblong, red-brown, the column white.

Masdevallia demissa, Rchb. in Gard. Chron. II. s. 3. (1817), p. 9.

A species of dwarf habit, with red-brown and yellow flowers, resembling on superficial glance a diminished *Masdevallia corniculata*, but the hooded bract of which is replaced in this species by a small loose membranous one, a character which removes it from the sub-section *Cucullatae*. It was recently imported from Costa Rica by Messrs. Shuttleworth and Carder. We are indebted to Mr. Sydney Courtauld, of Bocking Place, Braintree, for materials for description.

M. *elephanticeps*.

Leaves narrowly spatulate-cuneate, approaching linear-oblong, 6—10 inches long, very leathery. Scapes stoutish, shorter than the leaves, dotted with dull purple, with 2—3 small sheathing bracts, one-flowered. Flowers large for the genus, horizontal or deflexed; perianth tube broadly cylindric, yellowish above, dull purple beneath; upper sepal triangular, elongated, keeled above, gradually contracted into a long coriaceous yellowish tail, 2—3 inches long; lateral sepals reddish purple on the inner side, dull purple beneath, oblong, connate to nearly the middle and contracted into yellowish tails; petals oblong, acute; lip ligulate or oblong, papillose above.

Masdevallia elephanticeps, Rchb. *Xen. Orch.* I. p. 6, t. 3 (1854). Id. p. 194, t. 74 (pachysepala). Id. in Bonpl. II. p. 116 (1854). Van Houtte's *Fl. des Serres*, X. t. 997 (copied from *Xen. Orch.*).

This remarkable species was discovered by Warscewicz, in 1850—51, on the eastern Cordillera of New Granada, between Ocaña and Pamplona, at 6,500—10,000 feet elevation, and where many years afterwards it was gathered by Bowman, Brückmüller, and Shuttleworth. It has recently been introduced by more than one horticultural firm, and is now in cultivation in several collections. The variety *pachysepala*, which does not appear to be yet in cultivation, was gathered by Schlim, near Ocaña. The fanciful resemblance of the flower to an elephant's head and trunk, when viewed from above, suggested the specific name.

M. *Ephippium*.

Leaves narrowly elliptic-lanceolate, 5—7 inches long, attenuated below into a channelled foot-stalk, half as long as the blade. Scapes



Masdevallia Ephippium.

stoutish, flexuose, sharply trigonal, 12 or more inches high, with an obovate compressed bract about an inch below the short ovary, the intervening portion of the peduncle slender and terete. Perianth tube cylindric, short; upper sepal sub-orbicular, keeled, yellow stained with brown without, concave and tawny yellow within, contracted into a yellow reflexed tail, 3—4 inches long; lateral sepals sub-orbicular, forming a hemispherical cup, ribbed within and without, reddish or chestnut-brown, contracted like the upper sepal into long flexuose yellow tails; petals white, linear, acute, but sometimes 2—3 toothed at the apex; lip oblong, apiculate, clawed and auriculate at the base, toothed towards the apex, reddish brown. Column whitish.

Masdevallia Ephippium, Rchb. in *Bot. Zeit.* 1873, p. 390. Id. in *Gard. Chron.* I. (1874), p. 372. Id. *Xen. Orch.* II. p. 213, t. 195. *Bot. Mag.* t. 6208. M. *Trochilus*, Lind. et André, *Illus. hort.* 1874, p. 136, t. 180. *Fl. Mag.* n. s. t. 443. M. *acrochordonia*, Rchb. *Xen. Orch.* II. p. 213 (1874). Id. in *Gard. Chron.* XXIII. (1885), p. 174. Id. XXVI. (1886), p. 526. M. *Colibre*, nom. vulg. *fide* Roezl.*

The botanical history of this species is somewhat confused. According to Reichenbach, it was first discovered near Loxa, in Ecuador, by Dr. Krause, of Leipsic, who sent it to Messrs. Backhouse,† but some years later he states, in another place, that Wallis was its discoverer, this collector having met with it near Antioquia, in 1873, while on a mission to New Granada for M. Linden;‡ it was shortly afterwards gathered by Roezl and by Patin, near Medellin, and Mr. Shuttleworth informs us that it has been collected by Carder in the neighbourhood of the last-named town. Its New Granadian origin is therefore unquestionably established, and the Loxa locality must be referred to *Masdevallia acrochordonia* (Rchb.); but we have reduced this to a synonym of *M. Ephippium*, as we are unable to detect even a varietal distinction between the plants in cultivation under these names. *M. acrochordonia* was also discovered by Krause, near Loxa, and was introduced from that district, in 1884, by Messrs. Sander and Co. through their collector Hübsch.§ The presence of

* The names applied to this species have not been very felicitously selected. *Ephippium* (*εφίππιον*) means "a saddle," to which neither the flower nor any part of it bears any especial resemblance; *Trochilus* (*τρόχιλος*), "a wren," is equally far fetched; *Acrochordonia* (*ἀκροχόρδων*) is a Greek word of uncertain signification, but supposed to mean a kind of wart. *Colibre* (Spanish), *Colibri* (French), is "humming-bird."

† *Gard. Chron.* I. (1874), p. 372. *Bot. Mag.* sub. t. 6208.

‡ *Gard. Chron.* XXIII. (1885), p. 174. *Xen. Orch.* II. p. 214.

§ *Gard. Chron.* XXIII. (1885), p. 174. The statements made here and in I. (1874), p. 372, respecting the discovery of *Masdevallia Ephippium* and *M. acrochordonia*, by Krause, near Loxa, doubtless refer to one and the same species.

M. Ephippium in localities separated from each other by an interval of upwards of a thousand miles, is a singular fact in its history. As a species, its chief peculiarity is seen in the lateral sepals that form a deeply concave bowl-shaped body of a rufous brown colour, and their long flexuous tails that curve away from each other in a singular manner.

M. Erythrochæte.

Leaves linear-ob lanceolate, 6—8 inches long.* Scapes slender, nearly as long again as the leaves, with a closely appressed sheath at each joint and a larger one below the bent ovary, one-flowered. Perianth tube short, patent, yellowish white externally; free portion of sepals ovate-triangular, which, as well as the connate basal portions, are yellowish white spotted with red-purple and studded with numerous white hairs on the inner side; tails 2 inches long, reddish purple; petals minute; oblong, brown at the tips; lip as in *Masdevallia Chimæra*, but smaller, white faintly tinted with rose. Column white.

Masdevallia Erythrochæte, Rchb. in *Gard. Chron.* XVIII. (1882), p. 392.

Introduced by Messrs. Sander and Co., from Central America. It is very near *Masdevallia Chimæra* and *M. astuta*, from both of which it may be distinguished by its smaller flowers. The specific name, from *ἴρυθρος* (eruthros), "red," and *χαίτη* (chaité), "long hair," refers to the long slender tails.

M. Estradæ.

A dwarf, densely-tufted plant. Leaves elliptic-spathulate, leathery, 2—3 inches long including petioles, often bifid at the apex. Scapes slender, longer than the leaves, with a sheathing bract near the base, and another below the ovary, one-flowered. Perianth tube short, campanulate; free portion of upper sepal obovate-oblong, concave, almost helmet-shaped; lateral sepals oblong, obtuse, nearly flat with recurved margins, and terminating in long slender tails, 1½—2 inches long, basal half and tails yellow, distal half mauve-purple; petals and lip linear-oblong, whitish. Column white, spotted and margined with purple.

Masdevallia Estradæ, Rchb. in *Gard. Chron.* I. (1874), p. 435. *Bot. Mag.* t. 6171. *Belg. hort.* 1875, p. 371.

var.—*xanthina*.

Flowers pale honey-yellow with a mauve-purple spot at the base of the lateral sepals.

M. Estradæ xanthina, supra. *M. xanthina*, Rchb. in *Gard. Chron.* XIII. (1880), p. 681.

* A foot long, according to Reichenbach. Our description was taken from a plant in the Downside collection.

First found by Gustav Wallis in the garden of a New Granadian lady, named Doña Estrada, to whom it is dedicated. It was introduced in 1873, by Mr. B. S. Williams, of Holloway, from the province of Antioquia, through Patin, a Belgian collector. The variety, which differs from the type in nothing except colour, is doubtless from the same locality in New Granada, for although the materials for description were supplied by us, we have no record of its origin.

M. floribunda.

A dwarf, tufted plant. Leaves oblanceolate-oblong, 3—4 inches long including the foot-stalk. Scapes numerous, slender, decumbent, longer than the leaves, one-flowered. Flowers pale buff-yellow dotted with brown-purple; perianth tube cylindric, with a small gibbosity at the base on the lower side; free portion of sepals very short, that of the upper one triangular, of the lateral two rotund; tails, of which the upper one is the longest, slender, recurved, reddish; petals linear-oblong, toothed at the tip, white; lip 'nearly heart-shaped at its base, constricted below the middle and with red-brown blotch at the tip.'

Masdevallia floribunda, Lindl. in Bot. Reg. 1843, misc. p. 72. Rchb. in Gard. Chron. VIII. (1877), p. 616. *M. Galeottiana*, A. Rich. et Gal. Ann. Sc. Nat. s. 3, III. (1845), p. 17. *M. myriostigma*,* Morren in Belg. hort. 1873, p. 359, t. 33.

A very floriferous species, native of Mexico, and the first *Masdevallia* from that country that became known to science. It was gathered by Galeotti, in 1840, in the neighbourhood of Vera Cruz, and living plants were probably sent by him to Europe, for one was in cultivation three years later in the collection of the late Mr. Rogers, at Sevenoaks, from whom Dr. Lindley received materials for naming and description. It was re-introduced in 1873, by Messrs. Jacob-Makoy and Co., of Liége.

M. Gargantua.

A robust plant. Leaves oblong, fleshy, 6 inches long. Scapes terete, shorter than the leaves, one-flowered. Flowers large and leathery; perianth tube broadly cylindric, pale yellow-green above, gibbous and stained with dull purple beneath; free portion of upper sepal yellow, triangular, contracted into a tapering reflexed tail 2 inches long; lateral sepals oblong, terminating in divergent tails an inch long, verrucose, brown-purple bordered with yellow on the inner side; petals oblong, whitish; lip tongue-shaped, very hairy, deep purple. Column thick, whitish with some purple markings.

Masdevallia Gargantua, Rchb. in Gard. Chron. VI. (1876), p. 516.

* Calami lapsu passim fere, "myriosigma," which is meaningless. See Gard. Chron. loc. cit. supra.

Introduced by us, in 1874, from the Frontino district in New Granada, through Gustav Wallis. Its nearest allies are *Masdevallia elephanticeps* and *M. Mooreana*, from the latter of which it is not distinguishable in a dried state. When first expanded the flower emits a strong fetid odour. The specific name is that of one of the heroes in Rabelais' once famous story of *Gargantua and Pantagruel*.

M. Gaskelliana.

Leaves linear-lanceolate, acute, 3—4 inches long. Peduncles slender, mottled dull purple and green, one-flowered. Flowers triangular, about an inch across vertically, with a very short campanulate perianth tube; free portion of sepals triangular, with short hispid pubescence on the inner side, keeled behind, the upper one cream-white spotted with red, the lateral two similarly coloured but with the spots aggregated chiefly on the outer half of each; sepaline tails $1\frac{1}{2}$ —2 inches long, pale red-brown; petals ligulate, reflexed at the apex, where there is a brown hairy wart; lip narrowly saccate, with three longitudinal keels within the cavity, pale yellow. Column pale yellow, bent at the apex.

Masdevallia Gaskelliana, Rehb. in *Gard. Chron.* XX. (1883), p. 294.

Imported in 1882 by Messrs. Sander and Co., origin not recorded. It flowered for the first time in this country in the collection of Mr. Holbrook Gaskell, at Woolton Wood, near Liverpool, to whom it is dedicated. Its nearest affinity is *Masdevallia astuta*, with which the flowers are almost structurally identical but smaller in all their parts; it differs from that species chiefly in its much smaller leaves and one-flowered (?) peduncles.

M. gemmata.

A diminutive plant. Leaves linear, $1\frac{1}{2}$ —2 inches long, somewhat fleshy, grooved on the upper side. Peduncles filiform, decumbent, longer than the leaves, one-flowered. Upper sepal nearly free, triangular at the base, brownish yellow with purple veins, contracted into an orange-yellow filiform tail an inch long; lateral two larger, connate into an oblong, concave, somewhat boat-shaped body, vinous purple with deeper veins and with an orange-yellow tail inserted in each outer margin near the apex; petals and lip very minute, the former linear-oblong, obscurely toothed at the apex, the latter cordate-triangular, purple.

Masdevallia gemmata, Rehb. in *Gard. Chron.* XX. (1883), p. 294. M. *Trichæte*, Rehb. in *Gard. Chron.* XX. (1883), p. 360.

A recently introduced species of the TRIARISTELLE section, whose

habitat has not been divulged. It is as curious as it is beautiful, the flower when inverted having the resemblance of a large gnat. "The name *gemmata* refers to the hundreds of papillæ which stand by crowds on the anterior parts of the sepals, and a few on the lip."

M. hieroglyphica.

Leaves elliptic-lanceolate, leathery, 4—5 inches long. Peduncles slender, as long as the leaves, one-flowered. Perianth tube campanulate, gibbous below, mauve-purple, paler at the base; free portion of sepals shortly triangular, violet-purple mottled with white, the upper one with three deep purple longitudinal veins and with a glandular protuberance at the base of the tail; tails thread-like, 1½ inches long, purplish at the base, passing into dull yellow towards the apex; petals oblong, obtuse, white; lip broader, oblong, truncate, purple. Column white with some purplish spots.

Masdevallia hieroglyphica, Rehb. XVIII. (1882), p. 230. Id. in Gard. Chron. XXIV. (1885), p. 584.

Imported by Messrs. Sander and Co., from New Granada, in 1882. As regards colour, it is one of the most distinct of the smaller-flowered Masdevallias.

M. Houtteana.

Leaves linear-lanceolate, 5—7 inches long. Scapes slender, procumbent, shorter than the leaves, one-flowered. Flowers ¾-inch in diameter exclusive of the tails; perianth tube campanulate; free portion of sepals shortly triangular, cream-white spotted with purple and densely studded with short white hairs; tails spreading, 1½ inches long, reddish purple; petals small, oblong, dilated at the apex, where there is a dense tuft of short blackish hairs; lip oblong in outline, clawed, the claw (hypochile) curved upwards, broad, with an oval cavity in the upper side, the blade (epichile) sub-round, concave, with several radiating raised lines in the hollow, generally white, but sometimes pale pink. Column short.

Masdevallia Houtteana, Rehb. in Gard. Chron. II. (1874), p. 98 (July). Van Houtte's *Pl. des Serres* XX. t. 2106. M. Benedictii, Rehb. Xen. Orch. II. p. 197 (Oct. 1874). M. psittacina, Rehb. in Gard. Chron. V. (1876), p. 817.

An interesting species, and in some of its characteristics a distinct one also; in its vegetation it is not unlike a dwarf sedge, a character by which it may be readily recognised amidst the general uniformity of foliage that prevails throughout the cultivated Masdevallias. Its flowers are produced very freely from the rhizome, and, in curious contrast to the rigid upright leaves, lie prostrate on the sphagnum,

or protrude over the rim of the pot or between the rods of the basket in which it is cultivated; they are somewhat variable in size and colour, particularly in the spotting on the sepals. *Masdevallia Houtteana* occurs on the western Cordillera of New Granada, in the neighbourhood of Frontino, where its vertical range is 4,500—6,000 feet elevation; it grows chiefly in small tufts on low trees and shrubs, sometimes on the trunks, but more frequently towards the extremities of the branches; it was first detected by Roezl, and shortly afterwards by Wallis, through whom it was introduced. It is dedicated to the late Louis Van Houtte, the well-known horticulturist of Ghent.

M. ignea.

Leaves elliptic-lanceolate, 3—4 inches long, narrowed below into a channelled petiole, half as long as the blade. Scapes slender, 12—15 or more inches long, one-flowered. Flowers $1\frac{1}{2}$ — $2\frac{1}{2}$ inches across vertically, somewhat variable in colour, usually bright cinnabar-red toned with crimson; perianth tube bent, gibbous below; upper sepal with a narrow triangular base, prolonged at the apex into a linear tail that is bent downwards into the sinus between the two lateral sepals, which are connate to more than half their length, elliptic-oblong, pointed, three-nerved, the free portions more or less divergent; petals linear-oblong, auricled below, white, with a purple mid-line; lip similar, recurved at the apex where there is an orange-red stain.

Masdevallia ignea, Rchb. in *Gard. Chron.* 1871, p. 1482. *Bot. Mag.* t. 5962. *Fl. Mag.* n. s. t. 15. *Fl. and Pom.* 1873, p. 169. *Illus. hort.* n. s. t. 333. Williams' *Orch. Alb.* II. t. 62. Godofroy's *Orchidophile*, 1885, p. 367. *M. coccinea*, Regel's *Gartenfl.* 1876, t. 170, not Lindl.

var.—*Massangeana*.

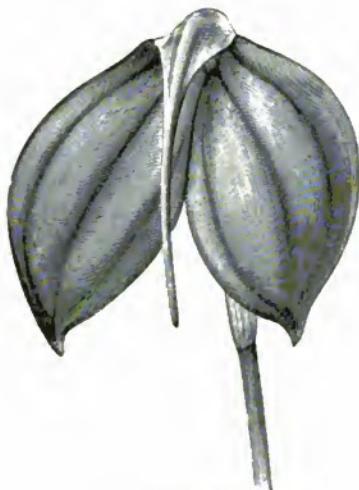
Flowers larger than the commoner forms, with the lateral sepals longer, bright cinnabar-red; perianth tube yellow.

M. ignea Massangeana, Williams' *Orch. Alb.* VI. t. 273.

sub-vars. (distinguished by colour only).—*aurantiaca*, light orange-red; *M. Boddaert's* (*Illus. hort.* 1880, t. 357), crimson-scarlet, spotted with pale yellow; *citrina*, light orange-yellow; *Mr. Marshall's* (*Gard. Chron.* 1872, p. 351), yellow, toned with cinnabar-red; *Mr. Hobart's* (*Gard. Chron.* XV. (1881), p. 136), orange-yellow, faintly tinted with mauve-purple.

Introduced by Messrs. Low and Co., in 1870, from the eastern Cordillera of New Granada, on which it spreads from Ocaña southwards as far as Rosa, with a vertical range of 8,500—11,000 feet elevation. In such an extensive range *Masdevallia ignea* affects a

variety of situations, a circumstance which has influenced the habit of the plants and the colour of the flowers; thus, at and near the lower limits of its vertical range, where the soil is deeper and where the plants are often in partial shade, the leaves are longer and less rigid, the peduncles are longer and more slender, and the flowers uniform in colour; towards the higher limits the plants become somewhat dwarfer and the flowers vary a



Masdevallia ignea.

little in colour. On account of the brilliant colour of the flowers, and the improvement of which the species is susceptible under cultivation, *M. ignea* has become a general favourite amongst orchid amateurs.*

M. infracta.

Leaves lanceolate, leathery, 5—6 inches long, bright glossy green.—Scapes three-angled, twisted, longer than the leaves. Perianth tube broadly campanulate, bent, with a prominent rib above and a

* It is with much hesitation that we retain this species under the name it is described above, believing that it should be referred to *Masdevallia militaris*, Rchb., which had been introduced by Warscewicz from the same locality twenty years earlier. As we have, thus far, been unable to obtain satisfactory proof of the identity of the two species, and moreover as *M. militaris* is said to be constitutionally distinct from the *M. ignea* in cultivation, it seems to us that the best course is to keep them separate for the present.

gibbosity below at the base, yellowish white; free portion of upper sepal triangular-rotund, concave, yellowish white like the tube, the lateral two oblong-rotund, connate to below the middle, keeled at the suture, the outer half yellowish white, inner half pale violet-purple; tails spreading, $1\frac{1}{2}$ —2 inches long, pale yellow; petals linear-oblong, toothed at the apex, white; lip oblong, reflexed at the spotted red-brown apex.

Masdevallia infracta, Lindl. Gen. et Sp. Orch. p. 193 (1831). *Belg. hort.* 1873, p. 35. Van Houtte's *Pl. des Serres XXIII.* t. 2389. *M. longicaudata*, Lemaire in *Illus. hort.* 1868, p. 109, icon. xyl.

var.—*purpurea*.

Flowers somewhat larger and of a nearly uniform violet-purple.

M. infracta purpurea, Rchb. in *Gard. Chron.* XX. (1883), p. 460.

A Brazilian species discovered in the early part of the present century by the French traveller and naturalist, Descourtilz, on the wooded mountains which separate Rio de Janeiro from the Campos. It was gathered by Gardner on the Organ Mountains in 1837, and sent by him to Messrs. Loddiges, in whose nursery at Hackney it flowered for the first time in this country in the following year. In a geographical sense, *Masdevallia infracta* is a remotely outlying member of the genus, its nearest ally, so far as at present known, being an inhabitant of the Peruvian Andes, upwards of 2,000 miles distant. The glossy, shining surface of the leaves is a marked feature in this species. Of the two known forms, which are simply colour variations, the purple one is the more showy. The applicability of the name *infracta*, "unbroken," is obscure.

M. *Ionocharis*.

A dwarf, tufted plant. Leaves elliptic-lanceolate, 3—4 inches long, including the foot-stalk. Scapes numerous, slender, as long as the leaves, bearing a solitary flower half an inch in diameter, and with a compressed tubular bract below the ovary. Perianth tube campanulate, yellowish; the sepals keeled at the back, the free portions very short, rotund, white blotched with violet-purple; tails slender, spreading, about as long as the tube, yellow; petals and lip minute, the former oblong, auricled at the base, the latter clawed, tongue-shaped, apiculate, purplish.

Masdevallia Ionocharis, Rchb. in *Gard. Chron.* IV. (1875), p. 388. *Bot. Mag.* t. 6262.

A pretty free-flowering species introduced by us in 1874, from Peru, through our collector, Walter Davis, who discovered it in the Andean valley of Sandia, in the province of Caravaya, at 9,000—

10,000 feet elevation. The specific name is a compound of two words, *īov* (ion), "a violet," and *χάρις* (charis), "pleasure or joy."



Masdevallia leontoglossa.

M. leontoglossa.

Leaves linear-lanceolate, 5—7 inches long, very leathery, sometimes tinged with deep, dull purple. Flowers with very short peduncles; perianth tube broadly cylindric, gibbous below, pale yellow-green with three purple spotted ribs above, and spotted with dull purple beneath; free portion of upper sepal triangular, contracted into a broad tail an

inch long, pale yellow-green with three purple lines on the inner side; lateral sepals oblong, connate to one-half of their length, the free portion triangular, prolonged into short tails, pale yellow-green, spotted with blackish purple warts that are usually arranged in rows, with a blackish purple line between them; petals oblong, acute, white with a purple median line and another shorter one on the inside; lip tongue-shaped, hairy, densely spotted with vinous purple papillæ. Column white with purple edges.

Masdevallia leontoglossa, Rehb. in Bonpl. III. p. 69 (1855). Id. in Walp. Ann. VI. p. 191. Id. in Gard. Chron. XV. (1881), p. 234. Gard. Chron. XXIV. (1885), p. 429. icon. xyl.

A curious species belonging to the sub-section *Coriaceæ*, discovered many years ago in Venezuela by Wagener,* and was introduced about the year 1867 to M. Linden's horticultural establishment at Brussels. It is now in several British collections, where its curious structure and beautiful markings rarely fail to arrest the attention of the observer. The specific name indicates the supposed resemblance of the lip to a lion's tongue.

M. ludibunda.

Leaves elliptic-oblong, 2—3 inches long. Scapes slender, longer than the leaves, one-flowered. Perianth tube short, ochreous yellow; free portion of sepals ovate-oblong, the upper one almost galeate, purple, and prominently keeled above, the lateral two light violet-purple in one variety, pale yellow in another; tails filiform, 1½—2 inches long, light orange-yellow; petals oblong, toothed at the apex; lip sub-pandurate, yellowish with a blackish wart at the reflexed tip.

Masdevallia ludibunda, Rehb. in Gard. Chron. XVII. (1882), p. 179.

One of the prettiest, and probably one of the rarest of the *Caudatae* sub-section of *Masdevallias*. It was introduced by Messrs. Sander and Co. along with *M. caudata Shuttleworthii*, and therefore its habitat is within the geographical range of that species. There are two distinct colour forms in Sir Trevor Lawrence's collection at Burford Lodge, as described above. As a species—if species it is—it stands between *M. caudata* and *M. Estradæ*, and but for the uncertainty respecting the precise habitat of the last-named species, and for the fact that the artificially raised hybrid *caudata-Estrada* is quite distinct from it, it might be assumed to be a natural hybrid between them; the name *ludibunda*, "sportive," probably has some indirect allusion to such an hypothesis of origin.

* Wagener's explorations extended for some miles along the coast range in the neighbourhood of Caracas, hence the habitat of this species may be surmised.

M. macrura.

A robust plant. Stems about 6 inches high. Leaves elliptic-oblong, 10—12 inches long, and $2\frac{1}{2}$ —3 inches broad, very leathery. Scapes as long as the leaves, one-flowered, the ovary and base of perianth tube sheathed by a whitish membranous keeled bract. Flowers among the largest in the genus; perianth tube short, cylindric, ribbed, dull tawny yellow shaded with brown externally as are the free portions of the sepals, on the inner side both sepals and tube tawny yellow studded with numerous blackish purple warts; tails paler and without warts; free portion of upper sepal lanceolate, acuminate, prolonged into a stoutish tail, 4—5 inches long; lateral sepals connate to fully one inch beyond the tube, and then tapering into tails as long as the upper one; petals and lip oblong, pale tawny yellow, the lip with a papillose, reflexed tip, and spotted with purple below.

Masdevallia macrura, Rehb. in *Gard. Chron.* I. (1874), p. 240 and VII. (1877), p. 12, icon. xyl. Id. in *Linnaea*, XL. p. 11.

Discovered by Roezl in 1871, near Sonson, growing on the moss-covered blocks of granite that are scattered over the ground around the town,* and afterwards found by Patin and other collectors, but not introduced till 1876, when it was collected by Shuttleworth between Frias and Libano, in the province of Tolima, New Granada, and sent by him to Mr. Bull, in whose horticultural establishment at Chelsea it flowered for the first time in this country early in the following year. The plant is a giant among *Masdevallias*, the leaves being among the largest in the genus yet known; the flower, which is proportionately large, is an object of curiosity rather than admiration. The specific name, from *μακρὸς* (makros), "long," and *οὐρά* (oura), "a tail," refers to the long sepaline tails.

M. maculata.

Leaves linear-lanceolate, 4—5 inches long. Scapes a little longer than the leaves, few-flowered, three-angled up to within about 2 inches of the short deflexed ovary, the remainder slender, terete, sheathed by two whitish, papery, opposite bracts above the trigonal part, and by two smaller, compressed, acute green ones below the ovary. Perianth tube short, with a prominent rib above, orange-yellow; free portion of upper sepal triangular, gradually contracted into a stoutish yellow tail 3 inches long; lateral sepals connate to below the middle,

* Godefroy's *Orchidophile*, 1883, p. 643. That Roezl was the first discoverer of *Masdevallia Macrura* is emphatically affirmed by Reichenbach in the *Gardeners' Chronicle*, loc. cit. supra. The statement in that journal, III. s. 3. (1883), p. 12, copied from *Lindenia*, that Wallis was the discoverer, and Linden the introducer, must therefore be received with reserve.

the inner half brown-purple, the outer half yellow, and then contracted into pale yellow tails that are sometimes parallel and bent downwards, sometimes crossing each other; petals and lip oblong, the former white, the latter dull purple, papillose and recurved at the apex.

Masdevallia maculata, Klotzsch and Karsten in *Allg. Gartenz.* XV. p. 330 (1847), Rchb. in *Bonpl.* II. p. 23 (1854). Van Houtte's *Fl. des Serres*, *XXI*. t. 2150.

var.—*flava*.

Flowers smaller than those of the typical *Masdevallia maculata*, with shorter sepaline tails and of a uniform tawny yellow.

M. maculata flava, supra.

Discovered by Wagener, in the neighbourhood of Caracas, and sent by him to the Botanic Garden at Berlin, where it flowered for the first time in Europe in 1847. The variety appeared amongst an importation of the species from Caracas by Messrs. Sander and Co., in 1881.

M. *Melanopus*.

Leaves oblanceolate, 4—5 inches long, narrowed below into slender petioles, bidentate at tip. Scapes numerous, longer than the leaves, racemose, 5—7 flowered. Flowers white, sparingly speckled with purple; perianth tube shortly campanulate, three-angled, gibbous below; free portion of sepals sub-orbicular, concave within, keeled behind, and contracted into rather short, slender, bright yellow tails; petals linear-oblong, minute; lip tongue-shaped, dilated at the apex into a round yellow terminal lobe.

Masdevallia Melanopus, Rchb. in *Gard. Chron.* I. (1874), p. 338. Id. II. p. 322. Id. III. (1875), p. 136. *M. polysticta*, Hook. f. in *Bot. Mag.* t. 6258, not Rchb.

A small-flowered species, one of a batch of three or four discovered by Roezl in the temperate regions of the Andes of northern Peru, and sent by him to M. Ortgies, Inspector of the Botanic Garden at Zurich. It is one of the most attractive of the racemose *Masdevallias* (sub-section *Amandae*), reminding one of the charming little *Odontoglossum blandum*. The specific name, from *μέλανος* (melan), "black," and *πούς* (pous), "a foot," probably refers to the blackish stain sometimes seen on the scape just below the ovary.

M. *militaris*.

"Aff. *coccinea*, tepalis inequalibus, binervis; labello apice dilatato integro. Folia oblonga, acuta, basin versus anguste cuneata. Pedunculus validus folio suo vulgo dimidio longior violaceus. Perigonii tubulus incurvus septemlinearis, mento omnino obtusato evanescente, dein bilabiatus; labium superius a basi angustissima triangula, linearisetaceum,

sesquipollicare; labium inferius latissimum medium usque bilobum, lobi trianguli utrinque obtusati, apiculati; tepala ligulata, binervia, altero latere rectilinea, altero lobulato, 3—5 linearia; labellum ligulatum, apice dilatatum, obtusatum, integrum, androclinium margine cucullatum."

"Blüthe 2/3 der Grösse deren der *M. coccinea*; getrocknet, mennigroth; lebend, scharlach. Neu Granada."—Rehb. f. in Boupl. II. p. 115 (1854).

Masdevallia militaris, Rchb. loc. cit. Id. in Walp. Ann. VI. p. 193. Id. in Gard. Chron. XIII. (1880), p. 742.

Discovered by Warscewicz on the eastern Cordillera of New Granada, in the neighbourhood of Ocaña, in 1849—50, but the plants he collected died during transmission to Europe, except a few remains that were secured for the collection of the late Mr. Sigismund Rucker, at West Hill, Wandsworth, where they continued to be cultivated till the dispersion of the collection in 1875. It is still one of the rarest of Masdevallias in the form in which it was specifically recognised by the late Professor Reichenbach, who, in the *Gardeners' Chronicle*, XIII. (1880), p. 742, thus distinguishes it from *Masdevallia ignea*, "its next critical species." *

"It is very easily recognised by its extremely stiff, dark green leaf of great substance, standing on a petiole shorter than the blade, by a thicker peduncle, a much wider flower tube, and a wider limb. . . The lip is much broader and shorter (?) The plant does not flower very readily, while *Masdevallia ignea*, with its much broader and longer, lighter green, thinner, long-stalked leaves, and much less wide flowers, gives a profusion of bloom."

Although we find no record of the plant having been imported since its first introduction, it was in cultivation in the collections of Sir Trevor Lawrence, Bart., at Burford Lodge, and of the Baroness Rothschild, at Gunnersbury Park, at the date of the publication of the article just quoted, and may probably be still in those collections. We have also since met with plants under the name of *Masdevallia coccinea*, that conform to the characters described in the foregoing quotation.

M. Mooreana.

Leaves with inflated sheaths at their base, linear-oblong, 6—8 inches long, very leathery. Scapes one-flowered, stoutish, shorter than the leaves, obscurely angulate, green spotted with dull purple, sheathed at the base and middle. Tube broad, cylindric with a short gibbosity

* The description in the text is equally applicable to *Masdevallia ignea*, Rehb.

below; upper sepal triangular, gradually contracted into a linear tail, yellow on the inside, with three vinous purple streaks on the paler dilated basal portion; lateral sepals connate to nearly the middle, similar but more acute, the tails parallel, vinous red, covered with innumerable minute blackish purple papillæ on the inner side; tails yellowish towards the tip; petals oblong, acute, white, with a purple mid-line; lip oblong, blackish purple, hairy above. Column greenish white, with blackish purple edges.

Masdevallia Mooreana, Rehb. in *Gard. Chron.* XXI. (1884), p. 408. *Id. II.* s. 3 (1887), p. 777. *Bot. Mag.* t. 7015.

A curious *Masdevallia*, allied to *M. elephanticeps* and *M. Gargantua*, so near indeed to the last named that it may prove to be only a variety of it, or even identical; its origin does not appear to have been recorded. It is named in compliment to Mr. F. W. Moore, of the Royal Botanic Garden at Glasnevin, near Dublin. It is in cultivation in several collections under the name of *M. melanozantha*, which, according to the description in the *Gardeners' Chronicle*, IV. (1875), p. 580, must be a different species.

M. muscosa.

Leaves elliptic-oblong, 2 inches long, minutely tridentate at the tip narrowed below into a slender channelled foot-stalk shorter than the blade, very leathery, deep green above, stained with purple beneath. Scapes slender, 6—7 inches long, one-flowered, pale green, clothed with hispid moss-like hairs up to the small appressed bract just below the ovary, then glabrous to the base of the ovary, which is verrucose and bristly and bent horizontally. Flowers $\frac{3}{4}$ inch in diameter; perianth tube short, compressed, gibbous below; sepals narrowly triangular with three veins, prolonged into slender tails an inch long, pale buff-yellow; petals linear, longer than the column, their thickened apices meeting above it; lip clawed, the claw adnate to the bent foot of the column, the blade yellow, maroon at the apical edge, triangular, with the broad side at the apex, and with a yellow ridge from the base to the middle.

Masdevallia muscosa, Rehb. in *Gard. Chron.* III. (1875), p. 460. *Id. I.* s. 3. (1887), p. 836.

Of the many remarkable species included in *Masdevallia*, the flowers of some are distinguished by their brilliant colours, others by their grotesque form, and others again by their microscopic beauty, but *Masdevallia muscosa* stands apart from all these by reason of a peculiarity not yet observed in any other *Masdevallia*, although known to exist in two or three species belonging to other genera, viz., that of irritability or sensitiveness in the labellum, so

that "when an insect alights on it, it suddenly shuts up against the column and encloses its prey, as it were, in a box." We extract from the *Gardeners' Chronicle* of 25th June, 1887, the following account of the curious mechanism by which this is effected:—

"When a flower first opens, the tails of the sepals curve back and the labellum is seen with its bearded tip folded just beneath the arch of the petals as if held there. Presently, however, the triangular blade falls down and hangs like the lip of an *Oncidium*; this, on being first observed, was surmised to be owing to sensitiveness, and on testing it this surmise was found to be correct. The seat of irritability is only in the yellow ridge on the lip, and on touching this gently with a hair, the lip is at once raised, at first slowly and then closed suddenly, as it were, with a click. In about twenty minutes it descends again, and on being again touched it closes just as quickly as before. A winged aphid placed on the labellum was carried up and held firmly, and the same happened when a house-fly, was tried. Attempts to force the lip down again after it closed showed that the sensitiveness was of precisely the same nature as that of *Dionaea Muscipula* (Venus' Fly-trap), and it could not be made to remain down unless held. An insect alighting on the labellum would certainly touch the ridge, and would be lifted up and enclosed in the "box" formed when the lip is closed. The excessive hairiness of the scapes and ovaries, altogether exceptional among the cultivated *Masdevallias*, is no doubt intended to prevent crawling insects from gaining access to the flowers."

This curious plant was one of the discoveries of Shuttleworth, in New Granada, near San Domingo, on the central Cordillera, in the province of Tolima, while collecting orchids in that country for Mr. Bull, of Chelsea. The sensitiveness of the labellum was first observed by Mr. Bean, the foreman of the orchid department at the Royal Gardens, Kew; and to the Royal Gardens also we are indebted for the materials for description.

M. nycterina.

Leaves linear-ob lanceolate, 6—8 inches long, scapes pendulous or decumbent, shorter than the leaves, warty, deep purple, with a small pale acute bract at the base of the ovary, one-flowered. Flowers patent, triangular in outline; upper sepal triangular, connate with the lateral two at the base, which are ovate-triangular, and connate to below the middle, all keeled behind and contracted into slender, purple-red tails 3 inches long, the inner surface light yellow spotted with red, purple, and studded with short white hispid hairs; petals oblong-

dilated at apex into a rotund yellowish blade, on which are three or four blackish spots; lip with recurved fleshy claw and concave shell-like blade, in the hollow of which are numerous raised lines radiating from the claw. Column small, terete, white.

Masdevallia nycterina, Rchb. in *Gard. Chron.* 1873, p. 1238. *Id. I.* (1874), p. 639, icon. xyl. *M. Chimæra*, *Illus. hort.* 1873, t. 117, not Rchb. *De Puydt, Les Orch.* t. 22.

One of the discoveries of Gustav Wallis while collecting plants in New Granada in 1872, and sent by him to M. Linden, who, in error, distributed it under the name of *Masdevallia Chimæra*. Its habitat is in the neighbourhood of Frontino, on the western Cordillera, at 5,000—6,000 feet elevation, where it occurs under the same conditions as *M. bella* and *M. Vespertilio*. It is very near the first named species and *M. Vespertilio*. The specific name, from νυκτερινός, literally "nocturnal," may either refer to the sombre hues of the flower, or by metonymy, may be some fanciful allusion, as "the night bird," the "bat," etc.

M. pachyantha.

Leaves oblanceolate, 6 inches long, deep green and leathery. Scapes longer than the leaves, one-flowered. Flowers with a vertical diameter of 2—3 inches, exclusive of the sepaline tails; tube broadly cylindric, slightly bent, pale orange-yellow; upper sepal triangular, keeled above, pale yellow-green with three brown-purple veins, and contracted into a stoutish erect tail an inch long; lateral sepals ovate-oblong, connate to below the middle and prolonged into broad reflexed tails shorter than the upper one, pale yellow-green densely spotted with rose-purple, the spots larger and brighter in colour towards the base; tails bright yellow; petals ovate acute, whitish with a brown-purple median line; lip ligulate, reflexed at the tip, brown below, blackish at the apex. Column terete above, greenish with brown-purple margins.

Masdevallia pachyantha, Rchb. in *Gard. Chron.* XXI. (1884), p. 174.

Discovered many years ago by Cross, and afterwards found by Lehmann, but not introduced till 1883, when plants collected by Carder, in the valley of the Cauca, near Popayan, in New Granada, were sent by him to the horticultural establishment of Messrs. Shuttleworth and Carder, in Park Road, Clapham, where one of them flowered for the first time in May, 1886. Its nearest affinity is *Masdevallia coriacea*, from which it is chiefly distinguished by its larger flowers with longer and broader sepaline tails, by its differently formed and differently coloured lip, and by its densely

spotted perianth tube and lateral sepals. The specific name, from $\pi\alpha\chi\upsilon\zeta$ (pachus), "thick," and $\alpha\nu\thetao\zeta$ (anthos), a flower, refers to the leathery texture of the perianth.*

M. *Peristeria*.

Leaves oblanceolate-oblong, 4—6 inches long. Scapes shorter than the leaves, with a loosely sheathing bract at the joint below the ovary, one-flowered. Flowers 4—5 inches across from tip to tip of sepals; tube broadly cylindric, gibbous at the base, and with six prominent ribs, dull yellowish green externally; free portion of sepals triangular, yellow, spotted with purple, and contracted into stoutish, tawny yellow tails, $1\frac{1}{2}$ inches long; petals linear-oblong, acute, pale greenish yellow; lip "with a linear claw, and oblong sub-acute limb which is dilated in the middle and suddenly contracted beyond it, upper surface studded with amethystine papillæ, tip recurved." Column white.

Masdevallia Peristeria, Rehb. in Gard. Chron. I. (1874). p. 500. *Bot. Mag.* t. 6159. Van Houtte's *Fl. des Serres*, XXII. t. 2346. *Illus. hort.* s. 3. t. 327.

One of the handsomest of the coriaceous *Masdevallias*, introduced by us from New Granada, in 1873, through Gustav Wallis, who met with it in the province of Antioquia. The labellum is very singularly coloured, being covered with numerous close-set amethystine papillæ, and the top of the column and the petals have a striking resemblance to the same organs of the flower of the Dove Plant, *Peristeria elata*, which suggested the specific name. A variety with somewhat smaller flowers, and thence called *minor*, is in cultivation in the Royal Botanic Gardens at Glasnevin.

M. *platyglossa*.

Leaves oblong-lanceolate, 6 inches long, rigid, erect. Scapes decumbent, shorter than the leaves, one-flowered. Flowers of semi-transparent texture, and of a uniform light green; tube short, cylindric with a gibbosity below; free portion of sepals triangular, contracted to sharp points, each with three prominent veins; petals ligulate, with a triangular lacinia above the middle; lip oval-oblong, reflexed, and with numerous papillæ at the apex. Column minutely cucullate.

Masdevallia platyglossa, Rehb. in Gard. Chron. XVIII. (1882), p. 552.

A native of the province of Antioquia, New Granada, but by whom discovered and introduced we do not find recorded. The broad, fleshy lip, and the absence of the sepaline tails, well distinguish this

* This name is not especially applicable to this species; *Masdevallia elephanticeps*, *M. Gargantua*, *M. Mooreana*, for example, have much thicker perianths.

Masdevallia, the former character suggesting the specific name, which is from πλατὺς (platus), "broad," and γλῶσσα (glossa), "a tongue," in orchid terminology "lip."

M. polysticta.

Leaves sub-spathulate, emarginate, 5—6 inches long. Scapes longer than the leaves, pale green spotted with dull purple, racemose, 5—7 flowered. Flowers white spotted with purple, on short pedicels, at the base of which is a rather large, inflated, pale green bract; tube short; free portion of the dorsal sepal broadly ovate, concave; of the lateral two narrowly oblong, oblique, convex with a yellow mid-line, all with ciliolate margins, keeled behind, and terminating in slender tails that are white and spotted like the blade along the basal half, the distal half bright ochreous yellow; petals and lip minute, the former spathulate, apiculate, the latter oblong and channelled above.

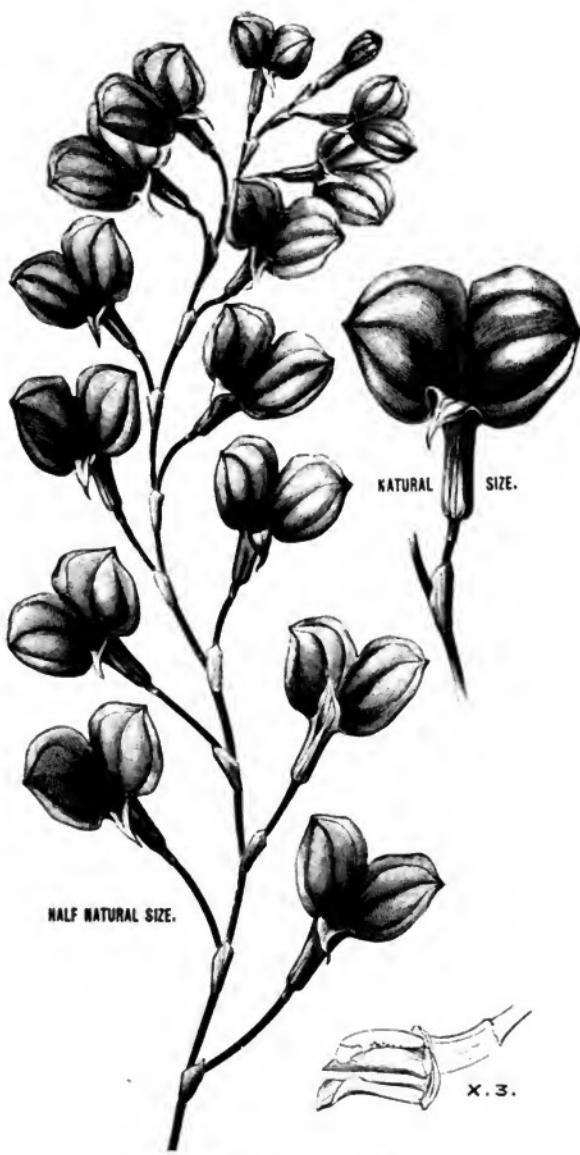
Masdevallia polysticta, Rehb. in *Gard. Chron.* I. (1874), p. 338. Id. II. p. 290. Id. III. (1875), p. 656. icon. xyl. *Bot. Mag.* t. 6368. Regel's *Gartenfl.* 1876, t. 869. *Illus. hort. s. 3.* t. 199. *Revue hort.* 1880, p. 250.

Of similar origin as *Masdevallia Melanopus*, with which is also associated a third species, called *M. caloptera*, not yet in cultivation. These, with three or four others known to science, form the subsection *Amandae*, all the members of which have a racemose inflorescence with rather small, white or light-coloured flowers, more or less spotted. As distinguished from *M. Melanopus*, *M. polysticta* has larger leaves, more robust scapes that are spotted, broader inflated bracts, larger flowers with broader sepals, that are hairy on the inner side and more spotted, and a differently shaped lip, especially at the apical end. It flowered for the first time in England in our Chelsea Nursery, in the spring of 1875. A variety with shorter and stouter tails was communicated to Professor Reichenbach by Sir Trevor Lawrence, Bart., in 1881.* The specific name, from πόλυς (polus), "much," and στικτός (stiktos), "dotted," refers to the spotted perianth.

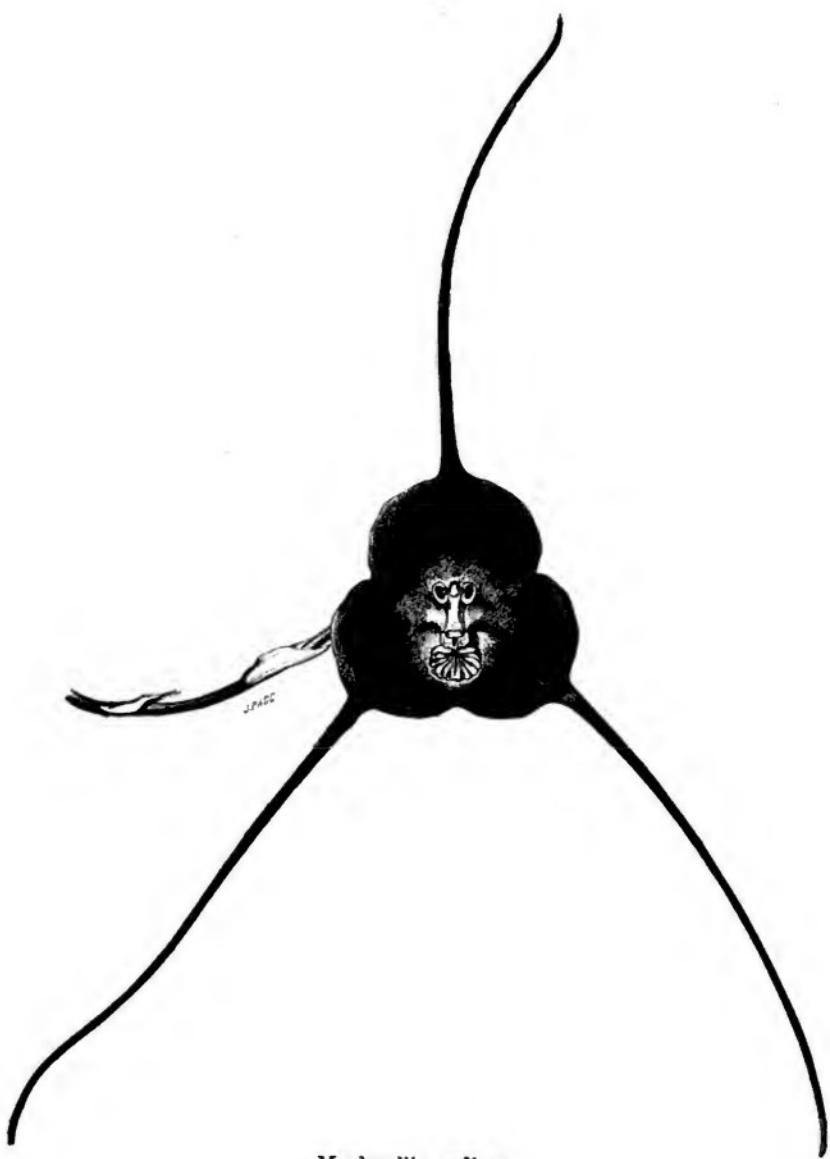
M. racemosa.

Stems erect, 1½—3 inches high, produced from a creeping rhizome at intervals of ½—1 inch. Leaves elliptic-oblong, 2—4 inches long. Scape 10—15 inches long, racemose, 8—15 or more flowered. Flowers brilliant orange-red shaded with crimson, sometimes paler approaching yellow; perianth tube cylindric, ribbed, ¼ inch long; free portion of

* *Masdevallia polysticta crassicaudata*, *Gard. Chron.* XVII. (1881), p. 179.



Masdevallia racemosa.



Masdevallia radiosua.

upper sepals triangular, acuminate, reflexed; lateral sepals connate into a broadly obovate, tailless blade 1—1½ inches broad, each with three longitudinal veins that are deeper in colour than the intervening surface; petals and lip minute, whitish, the former oval-oblong, the latter linear-oblong.

Masdevallia racemosa, Lindl. ex. Benth. Pl. Hartw. p. 258 (1839). Id. Ann. et Mag. Nat. Hist. pp. 15, 256 (1845). Rehb. in Bonpl. III. p. 69 (1885). Id. in Gard. Chron. XX. (1883), p. 466. Id. XXI. (1884), p. 737, icon. xyl. M. racemosa Crossii, Hort.

Originally discovered in New Granada, by Hartweg, from whose herbarium specimens it was named and described by Dr. Lindley, in 1839. Many years later it was gathered by Cross at Pitayo, near Popayan, whose name thence became attached to the plant, although he failed to send living plants to Europe, as did other collectors after him, it being, it is said, one of the worst of *Masdevallias* to travel. The merit of introduction is due to Mr. Carder, of the firm of Messrs. Shuttleworth and Carder, who succeeded in sending a small consignment of living plants to their horticultural establishment in Park Road, Clapham, in 1883. Mr. Carder gathered these plants on the central Cordillera, between Popayan and Tolima.

As a species *Masdevallia racemosa* is one of the most distinct. Although we have placed it in the sub-section *Coccinea* chiefly on account of its brilliantly coloured flowers, it is clearly separated from the other members of the group by its creeping rhizome and long racemes of tailless flowers—characters that would, by some, be considered of sufficient value to constitute a separate sub-sectional division.

M. *radiosa*.

Leaves lanceolate, 6—8 inches long. Scapes decumbent, shorter than the leaves, three or more-flowered, the flowers produced successively as in *Masdevallia astuta*, *M. Chimeira*, and other saccolabiate species. Perianth tube broadly campanulate; free portion of sepals similar and sub-equal, very short, broadly oval, keeled behind, concave, tawny yellow, pubescent, and densely spotted with blackish purple, warty papillæ in front, with a deep depression at the suture of the lateral pair; tails 2—3 inches long, dull blackish purple, paler towards the tips; petals oblong, keeled, dilated at the apex, at which is a blackish wart; lip with a fleshy claw and saccate shell-like blade, white with numerous rose-coloured radiating lamellæ within the sac. Column yellow above, blackish at the tip.

Masdevallia radiosa, Rehb. in Gard. Chron. VII. (1877), p. 684.

Discovered by Gustav Wallis near Frontino, in New Granada, at 8,000 feet elevation, and introduced with other saccolabiate *Masdevallias* collected by him in the same locality in 1873-4.

M. Reichenbachiana.

Leaves oblanceolate, acute, 6 inches long, including the erect channelled foot-stalks. Scapes slender, erect, longer than the leaves, 2—4 flowered, the flowers produced in succession from pedicels springing from the joint below the ovary of the next older. Tube funnel-shaped, bent, reddish crimson above, pale yellow beneath; free portion of upper sepal triangular, yellowish white, contracted into a slender tail $1\frac{1}{2}$ inches long; lateral sepals deflexed, connate to one-half of their length, and then suddenly contracted into slender awns, which cross each other at their extremities, yellowish white; petals, lip, and column minute, and concealed within the tube.

Masdevallia Reichenbachiana, Endres, ex. Rchb. f. in *Gard. Chron.* IV. (1885), p. 257. Rchb. in *Gard. Chron.* XX. (1883), p. 360 (*aurantiaca*).

A native of Costa Rica, where it was first detected in 1873 by Endres, who sent living plants to Europe shortly afterwards, and at whose desire it was named in compliment to the late Professor Reichenbach, of Hamburg.

M. rosea.

Leaves elliptic-lanceolate, acute, 4—6 inches long, narrowed below into erect channelled foot-stalks. Scapes slender, a little longer than the leaves, one-flowered. Tube $1-1\frac{1}{2}$ inches long, angulate and compressed, reddish above, orange-yellow at the base; free portion of upper sepal filiform, 2 inches long, red above, yellow on the inner side, the lateral two dilated into ovate-lanceolate, concave, rosy carmine lobes, which are connate to about one-third of their length from the base, and terminate in short red tails; petals and lip reduced to minute ligulate white bodies, the latter with a tuft of blackish hairs at the apex. Column arched, white.

Masdevallia rosea, Lindl. in *Ann. and Mag. Nat. Hist.* XV. p. 257 (1845). Rchb. in *Walp. Ann.* VI. p. 192 (1861). Id. *Otia. Bot. Hamb.* p. 14. Id. *Gard. Chron.* XIII. (1880), p. 648. Id. XVII. p. 623. *Bely. hort.* 1882, p. 65.

Discovered by Hartweg about the year 1842, at a great elevation on the Andes, in the neighbourhood of Loxa, in Ecuador; from the dried specimens brought home by him, it was described by Dr. Lindley in the publication quoted above. It was afterwards found by Dr. Jameson, for many years in the service of the Government of Ecuador as Professor of Botany and Chemistry in the University of Quito. Nothing more was seen or heard of it till

1880, when M. Lehmann, after much toil and many privations, succeeded in reaching the elevated region to which the plant is restricted. By carefully packing the plants he collected, and by a rapid transport across the low-lying hot country that intervenes between the Andes and the Pacific Ocean, a transit that has proved fatal to thousands of beautiful orchids, M. Lehmann had the good fortune to ship his plants in good condition, and which reached England alive. *Masdevallia rosea* is a most floriferous species, and a large plant in full bloom is a very showy object; its long perianth tube is peculiar.



Masdevallia rosea.

M. Schlimii.

Leaves elliptic-obovate, 12 or more inches long, and 3 inches broad. Scapes longer than the leaves, racemose, 5--8 flowered, the pedicel of each sheathed by a whitish, membranous bract. Flowers with a vertical diameter of about 1½ inches, exclusive of the tails; tube short and open, light orange-yellow above; upper sepal triangular, concave, light yellow; lateral sepals connate to beyond the middle, broadly ovate, the free portion divergent, yellow, densely mottled with brownish purple papillæ; tails about 2 inches long, golden yellow; petals linear-oblong, white; lip also linear-oblong, pointed and reflexed at the apex. Column white with two purple stripes on the side opposite the lip.

Masdevallia Schlimii, Linden ex. Lindl. Orch. Lind. p. 5 (1846). Rehb. in Bonpl. II. p. 283 (1854). Id. in Gard. Chron. XIX. (1883), p. 532, icon. xyl. Bot. Mag. t. 6740. *M. polyantha*, Lindl. Orch. Lind. p. 6, *sic* Rolfe in Gard. Chron. V. s. 3 (1889), p. 743.



Masdevallia Schlimii.

Native of the mountains of Merida in Venezuela, at 6,000 feet

elevation, where it was discovered by Schlinn in 1843—44. It was not introduced into European gardens till 1883, when it was sent to Messrs. Sander and Co., of St. Albans, by one of their collectors. It was shortly afterwards found by our collector, Burke, on the eastern Cordillers of New Granada, near Cocui, whence it spreads northwards along the Cordillera, with a vertical range of 9,000—11,000 feet to near Bucaramanga. In this locality it is purely epiphytal, growing only on the old stunted trees where decaying vegetable matter can rest and accumulate. Its nearest affinity is *Masdevallia Ephippium*, but its large leaves much resemble those of *M. macrura*; its flowers are curious and even showy, but wanting the brilliant tints characteristic of the species included in the sub-section *Coccineæ*.

M. simula.

A minute cæspitose plant. Leaves linear, 2—3 inches long, channelled and bright grass-green above, but sometimes tinged with dull purple, obscurely keeled beneath. Peduncles with ovary $\frac{1}{2}$ — $\frac{3}{4}$ inch high, sheathed by scarious, pale brown bracts, one-flowered. Flowers half an inch in diameter; perianth tube short, upper sepal ovate, acuminate, concave on the inner side, keeled behind, pale yellow, evenly barred with purple; lateral sepals free, ovate, falcate, acuminate, brighter yellow than the upper sepal and with small purple spots; petals linear, greenish; lip much larger, broadly tongue-shaped, dull vinous purple.

Masdevallia simula, Rehb. in Gard. Chron. III. (1875), p. 8.

Introduced by us in 1874 from New Granada, through Chesterton, who gave no locality. It is noticed here on account of its gem-like flowers, which are of surprising beauty when viewed through a common pocket lens.

M. tovarensis.

Leaves elliptic-spathulate, 5—6 inches long, obscurely toothed at the apex. Scapes as long as the leaves, three-angled, bi-bracteate at the apex, 2—5 flowered. Flowers an inch across transversely, pure white; tube cylindric, slightly gibbous below; upper sepal filiform, 1½ inches long, dilated into a triangular base; lateral sepals oval-oblong, three-nerved, connate to two-thirds of their length, rather abruptly contracted at their apex into short awns; petals and lip oblong, the former unequally two-lobed, the latter pointed and reflexed at the apex.

Masdevallia tovarensis, Rehb. in Bonpl. III. p. 225 (1855). Id. in Linnaea, XXII. p. 818 (1857). Bot. Mag. t. 5505. Gard. Chron. 1865, p. 914, icon. xyl. Fl. and Pomol. 1873, p. 169. Illus. hort. XXVI. t. 363. M. candida, Klotzsch.

Discovered about the year 1849 by Wagener, at a place called Tovar, situated at a considerable elevation on the coast range of Venezuela in the province of Caracas. Plants were sent by him to Germany, one of which was subsequently obtained by the late Mr. Sigismund Rucker, in whose collection at West Hill, Wandsworth, it flowered for the first time in this country in November, 1864. *Mas-*



Masdevallia tovarensis.

devallia tovarensis continued to be a comparatively rare plant in British collections till 1880, when a large importation of native plants was received by Messrs. Low and Co., of Clapton. Ever since its first introduction this *Masdevallia* has been one of the most highly prized of orchids on account of its pure white flowers that are produced late in the autumn, and which last nearly till Christmas.

A morphological peculiarity in *Masdevallia tovarensis* and also in the allied species *M. Ephippium*, *M. infracta*, and *M. maculata*, that was omitted when drawing up the sub-sectional characters of the *Polyanthe* Masdevallias, may properly be noticed here. The so-called peduncles or scapes of all these species are sharply three-angled, and the flowers are produced from their apex, the pedicels issuing from a membranous, persistent sheath that is single in *M. Ephippium* and *M. infracta*, but double in *M. maculata* and *M. tovarensis*. When the flowers fade the pedicels and ovaries wither and drop with them if unfertilised, which is usually the case, but the long, trigonal part does not wither and drop like the flower scapes of most Masdevallias; it continues green and fresh, and if not removed from the plant, more flowers are produced from the apex in the following year precisely in the same way as on the first occasion; the same occurrence has been observed in the third season, so that it may be assumed, in default of direct observation, that so long as the leaf, from the base of which the so-called scape springs, is in a condition to perform its functions, so long will the flowers be produced from the apex of these trigonal scapes on the return of the flowering season. This circumstance shows that there is a material difference between the slender, terete scapes of those Masdevallias that perish when the flowers drop and the more robust, three-angled ones of the species in question, that persist and produce flowers from their apex two, three, or more seasons in succession. The latter are, in fact, bi-, tri-, and even perennial leafless stems, and not scapes in the strict botanical meaning of the term, such as is implied in the foregoing descriptions. It is highly probable, too, that this peculiarity is not confined to the species named above, but in the absence of direct observation we are unable to specify any others by name.

M. triangularis.

Leaves elliptic-oblong, 4—6 inches long, narrowed below into a somewhat slender petiole as long as the blade. Scape slender, as long as the leaves, with a small, keeled, acute, spotted bract at the base of the ovary, one-flowered. Perianth tube broadly campanulate; sepals triangular-oblong, concave, keeled at the back, the lateral two sub-falcate, tawny yellow, densely spotted with purple; tails filiform, $2\frac{1}{2}$ —3 inches long, brownish purple; petals oblong, tridentate at the tip, white; lip oblong, dilated at the middle and reflexed at the apex, at which there is a small tuft of blackish hairs, white, spotted with red-purple below.

Masdevallia triangularis, Lindl. Orch. Lind. p. 5 (1846). Rchb. in Bonpl. II. p. 23 (1854). Id. in Gard. Chron. XVII. (1852), p. 44.

One of the prettiest of the *Caudatae* sub-section that was first discovered by Linden, in 1842—3, near Merida, in Venezuela, and re-

discovered a few years later by Wagener, in the province of Caracas. We find no record of its being in cultivation till 1882, it having been imported the year before by Messrs. Sander and Co.

M. triaristella.

"Dwarf, densely tufted. Leaves erect, 1—1½ inches long, slender, subulate and narrowed to both ends, channelled down the face. Scapes 1—2 flowered, very slender and rigid, rough with minute warts, and bearing two or more short appressed sheaths. Flowers nearly an inch long, red-brown with yellow tails; upper sepal small, ovate, concave, suddenly contracted into a flexuous ascending tail, half-an-inch long; lateral sepals combined into a linear-oblong boat-shaped blade, which is notched at the tip, and bears on each margin beyond the middle a filiform tail about the same length as that of the dorsal sepal; petals linear-oblong, three-toothed at the tip; lip tongue-shaped, deeply two-lobed at the base. Column club-shaped."—*Botanical Magazine*.

Masdevallia triaristella, Rehb. in *Gard. Chron.* VI. (1876), p. 226. Id. 559, icon. xyl. *Bot. Mag.* t. 6268.

A curious and interesting little plant introduced by us from Costa Rica, in 1875, through Endres. It is the type of a very distinct section of the genus called by Reichenbach TRIARISTELLE, of which the distinguishing characters are given in page 18. Allied to it are three or four other species in cultivation, including the next to be described, all of which, with one exception, *Masdevallia gemmata*, have received specific names in reference to their curious sepaline tails, thus *triaristella* means "having three awns"; *tridactylites*, "having three fingers"; *triglochin*, "having three barbs," etc.

M. Tridactylites.

A minute caespitose plant with erect awl-shaped leaves about 1½ inches long, channelled down the face. Scapes rigid, longer than the leaves, one-flowered. Upper sepal sub-orbicular, concave, keeled behind, ochreous yellow stained with red, and contracted into a yellow filiform tail, slightly swollen at the tip; lower connate sepals boat-shaped, notched at the tip, dull purple, tails similar to that of the upper sepal; petals oblong, acute, purple with yellow margins; lip tongue-shaped, dull purple.

Masdevallia Tridactylites, Rehb. in *Gard. Chron.* XIX. (1883), p. 784.

Very similar to *Masdevallia triaristella*, but a somewhat larger plant with differently coloured flowers. Its origin is presumably New Granadian, but no locality is recorded.*

* *Masdevallia Tridactylites* approaches the Restrepias nearer than any other *Masdevallia* yet observed; this affinity is seen chiefly in the free upper sepal with its club-like tail, and in the comparatively broad lip that is scarcely appressed to the column. Of course its two pollinia clearly separate it from the Restrepias, which always have four pollinia.

M. Troglodytes.

Leaves linear-lanceolate, 4—5 inches long, with recurved tridentate tips. Scapes shorter than the leaves, with a small appressed bract at each joint, decumbent, one-flowered. Flowers campanulate, reddish brown on the inside, white with a few brown spots externally; free portion of sepals very short, sub-rotund, prolonged into filiform, divergent, red-brown tails $1\frac{1}{2}$ inches long; petals ligulate, reddish brown bordered with white; lip with hypochile (claw) short, channelled, the epichile (sac) sub-orbicular, concave with one keel inside, white.

Masdevallia Troglodytes,* Morren in Belg. Hort. 1877, p. 97.

Introduced into European gardens by M. Lalinde, a resident of Medellin, in New Granada; it flowered for the first time in the collection of M. Oscar-Lamarche, at Liège, in Belgium, in 1876. Although the flowers are small and unattractive as regards colour, the great profusion in which they are produced secures for the plant a place in many collections. The specific name, *τρωγλοδύτης*, "dweller in caves," is a purely fanciful one, like *Chimæra*, *nycterina* and others.

In *Masdevallia Troglodytes*, *M. Houtteana*, and *M. Carderi* (to which others may probably be hereafter added) we have a series of closely-allied forms, which, seen singly, might be mistaken the one for the other. The chief botanical distinction between them consists in the structure of their curious labellum, thus—in *M. Carderi* the hypochile is comparatively broad with the cleft open, and the epichile is narrowly reniform with the concave surface smooth; in *M. Houtteana* the epichile is sub-quadrata and has three equidistant raised lines in the hollow; in *M. Troglodytes* the two divisions of the lip are smaller, and the epichile has but one raised line in its cavity. Moreover, in *M. Carderi* the sinus between the sepals is very shallow; in *M. Troglodytes* a little deeper; in *M. Houtteana* it is angular; the tails of the three species are differently coloured, as are the spots on their perianth tubes. The sedge-like foliage of *M. Houtteana* is peculiar to that species.

M. Veitchiana.

Leaves linear-oblong or linear-ob lanceolate, 6—8 inches long, sub-acute. Scape 12—18 inches long with two or more appressed, elongate, sheathing bracts, one- rarely two-flowered. Flowers among the largest and most showy in the genus, 2—3 inches across vertically, exclusive of the sepaline tails; perianth tube campanulate; free portion of sepals

* Reichenbach in Gard. Chron. XXIV. (1885), p. 489, sub. *Masdevallia senilis*, states that *M. Troglodytes*, Morr. = *M. Benedictii*, Rehb., but a comparison of the figure in the *Belgique Horticole* quoted above with that of *M. Benedictii* in Xen. Orch. II. t. 186, does not confirm this. The *M. Houtteana* and the *M. Benedictii* in cultivation are unquestionably one and the same species.

broadly ovate, contracted into slender tails, of which the upper one is



Masdevallia Veitchii.

narrower and longer than the others, brilliant orange-red studded with

minute crimson-purple papillæ, the lateral sepals connate to beyond the middle; petals and lip minute, linear-oblong, white, as is also the short semi-terete column.

Masdevallia Veitchiana, Rehb. in Gard. Chron. 1868, p. 814. *Bot. Mag.* t. 5739. Van Houtte's *Fl. des Serres*, XVII, t. 1803. *Fl. Mag.* t. 481. *Fl. and Pomol.* 1873, p. 169. Warner's *Sel. Orch.* II, t. 33. De Puydt, *Les Orch.* t. 25 (Veitchii).

This fine *Masdevallia* was discovered by Pearce on the lofty Andes of Peru, near Cuzco, at 11,000—13,000 feet elevation, and was introduced by us in 1867. It was gathered in the same locality a few years later by our collector, Davis, who has given us the following particulars respecting its habitat:—*Masdevallia Veitchiana* occurs above the timber line, at the altitude above stated; the plants are found in the crevices and hollows of the rocks with but little soil about their roots, but sometimes where a small quantity of decaying vegetable matter has accumulated; in this case the plants are more robust, and when partially shaded by the stunted shrubs found here and there or by projecting rocks, produce larger flowers; in the former case the plants are more tufted and more floriferous, but the flowers are smaller. At this great altitude, notwithstanding the tenuity of the atmosphere, the heat from the direct rays of an almost vertical sun is very great on clear days, but the nights are damp and chilly; the range of temperature is therefore very considerable. Vapour is constantly rising from the streams and valleys below, keeping the atmosphere always highly charged with moisture; besides this, rain is frequent, even in what is called the dry season.

Under cultivation the flowers of *Masdevallia Veitchiana* are found to vary in size and in the manner in which the papillæ are spread over the surface of the sepals; a large-flowered form is known in gardens under the name of *grandiflora*.*

M. veilifera.

Leaves linear-elliptic, 6—8 inches long, including the petioles, rigid and erect. Scapes stoutish, one-flowered, half as long as the leaves, with a sheathing bract midway between the base and the ovary, the last-named organ bent forwards at right angles to the peduncle. Tube

* As more than one sub-variety is found in collections under this name, we may state that the original *Masdevallia Veitchiana grandiflora* distributed by us may be recognised by the following characters:—the upper sepal is densely and almost uniformly covered with crimson papillæ, while in the lateral two these are confined entirely to the outer half, the inner half being of the purest orange-scarlet and destitute of papillæ. The foliage of the plant is also more robust, and is produced more slowly than in the ordinary form.

broadly cylindric, gibbous below; upper sepal triangular, contracted into a stoutish tail 2 inches long, ochreous yellow, very smooth and shining without, minutely dotted with red-brown within; the connate lateral sepals oblong, bent downwards, terminating in stoutish tails and coloured like the upper one; petals linear-oblong, greenish white; lip sub-quadratae, narrow at the apex, and covered with chocolate-red, close-set papillæ. Column trigonal, curved, yellowish green.

Masdevallia velifera, Rchb. in *Gard. Chron.* I. (1874), p. 406 (name only). Id. in II. p. 98. Id. in X. (1878), p. 364. Id. I. s. 3 (1887), p. 745, icon. xyl.



Masdevallia velifera.

(From the *Gardeners' Chronicle*.)

A species with large malodorous flowers sent by Patin from New Granada to Mr. B. S. Williams, in 1874. It is abundant in the neighbourhood of Ocaña, where a few years later it was gathered by Shuttleworth while collecting orchids for Mr. Bull. *Masdevallia velifera* is one of a group of coriaceous *Masdevallias* represented in British collections by *M. elephanticeps*, *M. Gargantua* and *M. Mooreana*, which may possibly be brought into closer connection with each other hereafter by the appearance of intermediate forms.

M. Vespertilio.

Leaves narrowly oblanceolate, 4–6 inches long. Scapes shorter than the leaves, pendulous, one-flowered. Flowers patent, triangular in outline, 1–1½ inches across vertically exclusive of the tails, pale yellow spotted with brown-purple; upper sepal ovate-oblong, acuminate, contracted into a slender tail 1½ inches long; lateral connate sepals sub-quadratae, prolonged into tails like that of the upper one; petals oblong, reflexed at the tip, white blotched with yellowish brown and with a brown papillose blotch on the inner side at the apex; lip with a fleshy grooved claw in which is a broad, longitudinal cleft on the upper side, and with a broad, transverse, shell-like blade, without radiating keels. Column bent, terete above.

Masdevallia Vespertilio, Rchb. in Bot. Zeit. 1873, p. 390. Id. in Gard. Chron. VII. (1877), p. 272. Id. XIII. (1880), p. 712.

One of the saccolabiate *Masdevallias* that has been gathered by various collectors in the valley of the Cauca, New Granada, (probably in the Frontino district), but not introduced till 1877; it is still rare in British gardens.

M. Wageneriana.

A dwarf, tufted plant. Leaves spathulate, leathery, about 2 inches long. Scapes as long as the leaves, one-flowered. Flowers light buff-yellow with numerous minute red dots sprinkled over the sepals, and some crimson lines at their base; sepals broadly oval-oblong, narrowing very suddenly to slender yellow tails 2 inches long, sharply bent backwards from the base, the upper one concave on the inner side, keeled behind, the lateral two connate to beyond the middle; petals hatchet-shaped, bidentate at apex; lip rhomboidal with reflexed, toothed margin, whitish spotted with red-brown, as is the short semi-terete column.

Masdevallia Wageneriana, Lindl. in Paxt. Fl. Gard. III. p. 74 (1853). *Bot. Mag.* t. 4921. Rchb. *Xen. Orch.* I. p. 199, t. 75.

A lovely little plant, discovered in 1849 near the German colony of Tovar in the Venezuelan province of Caracas. It was gathered in the following year by Wagener at Carobobo,* at 6,000 feet elevation, and sent by him to M. Linden, in whose horticultural establishment at Brussels it flowered for the first time in Europe in 1851.

* *Fide* Rchb. *Xen. Orch.* I. loc. cit. supra, but this name is not found on any map to which we have access.

M. *Wendlandiana*.

A densely tufted cæpitive plant. Leaves linear, 1—2 inches long, including petiole, fleshy, with a depressed mid-line on the face. Peduncles filiform, as long again as the leaves, pale green spotted with dull crimson, one-flowered. Perianth tube cylindric, gibbous and purple below, milk-white above; free portion of sepals narrowly triangular, white, passing into yellow at the tips, the lateral two reflexed; petals and lip very minute, linear-oblong, the petals white, the lip purplish, reflexed at the tip.

Masdevallia Wendlandiana, Rehb. in Gard. Chron. I. s. 3 (1887), p. 174.

Imported from New Granada by Messrs. Sander and Co., and dedicated to Herr Wendland, Director of the Berggarten at Herrenhausen, in Hanover. It is a most floriferous species, "far too pretty and interesting to be relegated to that dubious group known as botanical curiosities."* We are indebted to Mr. F. W. Moore, of the Botanic Garden, Glasnevin, for materials for description.

HYBRID MASDEVALLIAS.

When describing *Masdevallia splendida*,† the late Professor Reichenbach broached the hypothesis that it might be a natural hybrid between *M. Veitchiana* and *M. Barlaeania* or *M. amabilis*; and when about a year later, a flower of another plant from the same importation was submitted to him for identification, he called it *M. Parlatooreana*,‡ suggesting that that too might be a natural hybrid derived from *M. Veitchiana* and *M. Barlaeania*. The hypothesis, as regards these two species, has since been confirmed by Seden, who has obtained an artificial hybrid from them, of which *M. Veitchiana* was fertilised with the pollen of *M. Barlaeania*, the resulting progeny being so near the supposed natural hybrid that it must bear the same name. Moreover, *M. Parlatooreana* is so near *M. splendida* as to admit of no doubt of its being of like origin, probably from the reversed cross, and it must thence be reduced to a variety of the last named. The existence of natural hybrids among Masdevallias is, therefore, an undoubted fact, but to what extent they exist must long remain an uncertainty.

* "W. B." in Gard. Chron. III. s. 3 (1888), p. 563, who states that it requires tropical treatment.

† Gard. Chron. IX. (1878), p. 493.

‡ Id. XI. (1879), p. 172.

Long, however, before *Masdevallia splendida* had been produced artificially, hybridisation among the most showy species had been taken in hand by Seden in our nursery, but with only partial success, caused probably by the fact that *Masdevallia*, as a genus, is far more heterogenous than was at first supposed, whence a mixture of the different sections may not possibly be effected, and more recently progenies have been obtained by other operators. The forms described below include all the undoubted hybrids of which we have cognisance up to the present time, and which naturally fall under two heads, viz., Natural and Garden Hybrids: all have been derived from species included in the *Coccineæ* and *Caudatae* sub-sections, or from crosses between species belonging to each of them, the only exceptions at present known being *M. glaphyrantha* and *M. Hinckiana*, in which cases a species from the *Polyanthæ* group was selected for one of the parents. Their vegetative organs present scarcely any character by which they may be distinguished from either parent but the flowers, which are intermediate, are distinct, and these only need description.

NATURAL HYBRIDS.

Masdevallia splendida.

Perianth tube slender, nearly an inch long, with a prominent rib above, pale orange-red; free portion of sepals oval-oblong, three-nerved, bright orange-red studded with crimson-purple papillæ; tails an inch long, orange-red; petals, lip and column white, the latter with a purple streak on each side of the stigmatic cavity.

Masdevallia splendida, Rchb. in Gard. Chron. IX. (1878), p. 493.

var.—*Parlatoreana*.

Flowers larger, with the purple papillæ differently distributed over the surface of the sepals.

M. splendida Parlatoreana, supra. *M. Parlatoreana*, Rchb. in Gard. Chron. XI. (1879), p. 172.

Both forms were gathered on the eastern Cordillera of Peru, near Cuzco, by Walter Davis, who sent them to us in a consignment of *Masdevallia Veitchiana* and *M. Barleana*, with which they were mixed. The variety which is the more attractive of the two forms was dedicated to Professor Parlatore, of Florence, the most distinguished Italian botanist of his time. The artificially-raised hybrid surpasses the wild ones both in size of flower and in the brilliancy of its colours, a circumstance due to the finest forms of *M. Veitchiana* and *M. Barleana* being selected for parents.

GAEDEN HYBRIDS.

Masdevallia caudata-Estradæ.

Parentage expressed by the name.

Upper sepal a nearly uniform rose-purple, yellowish at the base, paler on the outside and with a yellowish keel; lateral sepals soft violet-purple, paler at the apex; tails 2 inches long, orange-yellow; petals and lip white, the latter with minute lilac spots; apex of column maroon-purple.

Masdevallia caudata-Estradæ, Rolfe in Gard. Chron. V. s. 3. (1889), p. 714.

Raised by Seden at our nursery. A very floriferous and handsome hybrid, with flowers much resembling *Masdevallia caudata Shuttleworthii* in size and shape, but also approaching *M. Estradæ* in some of its structural details.

M. Chelsoni.

M. amabilis × M. Veitchiana.

Perianth tube bright cinnabar-red, the veins crimson-purple; free portion of upper sepal oval, concave, contracted into a slender tail 2 inches long, brilliant orange-red studded with crimson papillæ; lateral sepals connate to beyond the middle and terminating in two convergent tails coloured like the upper one, the papillæ frequently aggregated in a broad band on the inner half of each.

Masdevallia Chelsoni, Rchb. in Gard. Chron. XIII. (1880), p. 554.

var.—splendens.

Flowers larger, of a deeper orange-red, especially the inner half of each of the lateral sepals, the crimson papillæ denser and more brilliant.

M..Chelsoni splendens, Veitch ex. Rolfe id Gard. Chron. V. s 3 (1889), p. 619.

Raised by Seden at our nursery, and especially interesting as being the first hybrid *Masdevallia* raised in Europe. As a decorative plant its flowers rank among the most brilliant known; "the colour is indescribably rich orange, crimson, rose, lilac, or a combination of all these, according to the direction in which the light falls upon the flower. No artist could render the colour of the flower faithfully, still more impossible would it be to describe it in words."* The variety was raised from the reversed cross and between two finer varieties of the same species that produced the type.

M. Courtauldiana.†

M. rosea × M. caudata Shuttleworthii.

"Upper part of perianth tube and triangular part of the upper sepal with its tail light brownish red, the three principal nerves keeled and

* Gard. Chron. XVII. (1882), p. 222.

† Not seen by us.

brown outside; lower part of tube and lateral sepals light rose colour; petals, lip and column white."

Masdevallia Courtauldiana, Rehb. in Gard. Chron. V. s. 3 (1889), p. 200.

Raised by Mr. Norman C. Cookson, of Oakwood, Wylam-on-Tyne, and dedicated to Mr. Sydney Courtauld, of Bocking Place, Braintree, an ardent amateur of Masdevallias. The flower is said to be equal in size to that of *Masdevallia rosea*, with the general shape of *M. caudata Shuttleworthii*.

M. Ellisiana.

M. coccinea Harryana × *M. ignea*.

Flowers nearly as in *Masdevallia ignea* but larger, and with the tail of the upper sepal erect, as in *M. coccinea (Lindenii)*; perianth tube bright yellow at the base, passing into rose-carmine upwards; upper sepal light rose-carmine, tip of tail orange-yellow; lateral sepals of the richest crimson faintly toned with orange-red, the veins deeper as in the parents.

Masdevallia Ellisiana, Rolfe in Gard. Chron. VI. s. 3 (1889), p. 154.

Raised by Seden at our nursery, and dedicated to Lady Howard de Walden, of the Mote Park, Maidstone. For brilliancy and distinctness in colour it is one of the best hybrids yet raised.

M. Fraseri.

M. ignea × *M. coccinea (Lindenii)*.

Perianth tube dull orange-red; free portion of sepals magenta-crimson suffused with orange. The form of the flower is nearly that of *Masdevallia ignea* except that the perianth tube is narrower, and the tail of the upper sepal is not curved downwards into the angle between the two lateral sepals, which terminate in short cusps.

Masdevallia Fraseri, Rehb. in Gard. Chron. XVII. (1882), p. 143.

Raised in the collection of Mr. Fraser, of Derncleugh, near Aberdeen.

M. Gairiana.

M. Veitchiana × *M. Davistii*.

Upper sepal triangular, elongated, yellow studded with crimson papillæ and contracted into a slender, golden yellow tail; connate lateral sepals broadly oblong, bright orange-yellow with numerous crimson papillæ towards the base and along the veins; the apical sinus rather broad, and the tails short.

Masdevallia Gairiana, Rehb. in Gard. Chron. XXII. (1884), p. 38.

Raised by Seden at our nursery, and dedicated to Mr. John Gair, of The Kilns, Falkirk, the possessor of one of the most select collections of orchids in Scotland. It is a very handsome Masdevallia; the upper

sepal is much like that of *Masdevallia Veitchiana*, but narrower in proportion to its length; the lateral sepals are nearly those of *M. Davisii*, but not so abruptly pointed.

M. Geleniana.

M. caudata Shuttleworthii × *M. Estradae zanthina*.

Flowers intermediate in size between those of the parents. Free portion of upper sepal orange-yellow with numerous purple dots chiefly along the veins; lateral sepals paler with fewer and more minute dots; tails $2\frac{1}{2}$ inches long, bright yellow.

Masdevallia Geleniana, Rchb. in Gard. Chron. II. s. 3 (1887), p. 586.

Raised by Messrs. Sander and Co. at their St. Albans nursery, and dedicated to Baron Hraby von Gelenye, of Peckau, in Bohemia.

M. glaphyrantha.

M. infracta × *M. Barlaiana*.

Scapes usually two-flowered. Flowers as large as those of *Masdevallia infracta*; perianth tube brownish red; upper sepal yellowish bordered with rose-purple, and with a rose-purple central streak; lateral sepals rose-purple with three deeper veins in each; tails orange-yellow.

Masdevallia glaphyrantha, Rchb. in Gard. Chron. XXVI. (1886), p. 648.

Raised by Seden at our nursery.

M. Hincksiana.

M. tovarensis × *M. ignea*.

Scapes 1—2 (or more) flowered. Flowers as large as those of *Masdevallia tovarensis*, clear buff-yellow, the perianth tube and dilated basal portion of the upper sepal paler, this organ nearly as in *M. tovarensis*; the lateral sepals connate to nearly the middle, acuminate, with shorter tails and with three nerves; petals and lip white.

Mesdevallia Hincksiana, Rchb. in Gard. Chron. II. s. 3 (1887), p. 214.

Raised by Captain Hincks, of Breckenbrough, Thirsk, Yorkshire.

EXCLUDED SPECIES.

Masdevallia		} now referred to ...	Pleurothallis	macroblepharis
Culex (Hort.)	...		(Rchb.)	
Dayana (Rchb.)	...	,,	Cryptophoranthus	Dayanum (Rolfe)
fenestrata (Hook.)	..	,,	,,	atropurpureum (Rolfe)

ARPOPHYLLUM.

Llav. et Lex. Nov. Veg. descript. Orch. p. 19 (1825). Benth. et Hook. Gen. Plant. III. p. 492 (1883).

Quite different as are the Arpophylla in aspect from the Pleurothallids and Masdevallias of tropical America on the one hand, and from such humble herbs as *Malaxis paludosa* and *Liparis Loeselli* of British fens on the other, they nevertheless form one of the connecting links in the chain of orchid affinities between the first and last named genera. They occupy this position chiefly in virtue of the structure of their flowers.

Four or five species of Arpophyllum are at present recognised, all natives of central America and Mexico, and of which one was found not long ago in Jamaica. Two of the species are well known in cultivation in British collections, and a third has been introduced into continental gardens. They differ chiefly from the allied genera in their large size and their long, dense, cylindrical, erect floral racemes, in which the flowers are inverted and spirally arranged round the axis. Their character will be sufficiently understood from the description of the two species given below.

The generic name Arpophyllum, from *ἀρπη* (harpé),* "a sword," and *φύλλον* (phullon), "a leaf," refers to the form of the leaves.

Cultural Note.—Although strictly epiphytal, the Arpophylla have a semi-terrestrial habit that renders them suitable for pot culture. The pots should be filled to fully two-thirds of their depth with clean broken crocks for drainage, over which should be placed a layer of sphagnum; the remainder and to at least an inch above the rim should be filled with a compost of fibrous peat and chopped sphagnum in equal proportions well mixed together. The plants should be placed in the centre, and held fast by a stick or any other suitable contrivance till firmly established. The general treatment of Arpophylla is in all other respects that of the Cattleyas, with which for cultural purposes they may be associated. They should, however, be placed in the lightest position, as they require but little or no shade except on bright hot days.

Arpophyllum giganteum.

A robust plant. Rhizome creeping, ligneous, as thick as the little finger. Stems terete, compressed, 6—10 inches high, jointed, with an appressed sheath at each joint nearly as long as the internode,

* Hence Harpophyllum would be more correct orthography.

monophyllous. Leaves ligulate, 12—15 inches long, coriaceous, rigid, bronzy purple when first developed, changing to green with age. Peduncle stoutish, issuing from a compressed purplish sheath, pale green dotted with blackish purple and terminating in a dense spike, frequently upwards of a foot long. Flowers very numerous, small, almost sessile, rosy purple, the lip deeper in colour than the other segments; sepals and petals oblong, reflexed at the apex, the petals narrower than the sepals; lip broadly obovate. Column very short; pollinia eight in two series of four.

Arpophyllum giganteum, Lindl. in Ann. Nat. Hist. IV. p. 384 (1840). Warner's Sel. Orch. I. t. 39 (1862-65).

Discovered by Hartweg in 1839, and introduced by him to the garden of the Horticultural Society of London, at Chiswick. It is a native of Mexico and Guatemala, occurring on the mountains and hills in isolated patches that are frequently remote from each other. Roezl met with it in the first named country on the Sante Comapau in immense masses on the trunks and branches of trees at the summit of the mountain. In this situation the plants are exposed from October to March to the violent storms which occasionally blow from the north with so great impetuosity, that under their influence a man can with difficulty keep on his feet, but which the *Arpophyllum* resists without injury.

A. *spicatum*.

Rhizome as thick as an ordinary writing-pencil. Stems erect, 3—6 inches long, as thick as the rhizome, monophyllous. Leaves linear, 9—12 inches long, complicate, falcate, very leathery. Peduncles with a basal sheath, 6—9 inches long including the dense terminal spike. Flowers one-third of an inch in diameter; sepals and petals pale rose-purple, the former ovate-oblong, the latter similar but narrower and with the margin erose; lip longer than the petals, concave, gibbous at the base, bright purple.

Arpophyllum spicatum, Llave et Lex. Nov. Veg. descript. II. p. 19 (1825). Lindl. Gen. et Sp. Orch. p. 151. Id. in Bot. Reg. XXV. misc. No. 16. Bot. Mag. t. 6022.

The typical species upon which the genus was founded by the Mexican botanists La Llave and Lexarza, in the early part of the present century. It has been reported from various parts of Mexico, and, like the preceding, was introduced into British gardens by Hartweg.

SUB-TRIBE LIPARIEÆ.

Stems often pseudo-bulbous, one- or many-leaved, racemes terminal. Column sessile, i.e., not produced into a foot; pollinia usually four, in two pairs, inappendiculate.

PLATYCLINIS.

Benth. in Jour. of Linn. Soc. XVIII. p. 295 (1881). Benth. et Hook. Gen. Plant. III. p. 496 (1883).

The only genus in this sub-tribe of which the included species are of any horticultural interest, is *Platyclinis*, established by Mr. Bentham on Blume's second section of *Dendrochilum*. Blume's typical *Dendrochilum* is a Java plant, possessing more of the characters of the **DENDROBIEÆ** than of the **LIPARIEÆ**, but with that he joined others having the characters of the last-named sub-tribe;* it is these that Mr. Bentham has separated from *Dendrochilum*, to which must now be added other species since discovered, the typical species with two or three others being retained under the original generic name. Thus circumscribed, *Platyclinis* includes about ten species, nearly all natives of Java and the Philippine Islands, those in cultivation being all from the last-named group.†

The essential characters of the genus may be thus briefly summarised :—

Epiphytic herbs with small pseudo-bulbs that are covered from below with scarious sheaths, and bear at their apex a single narrow leaf contracted to a short foot-stalk. Flowers small and numerous, in terminal pendulous racemes and usually distichous and alternate along the rachis. Column short, erect, and having two lateral branches or arms.

The generic name is derived from *πλατύς* (platus), "broad," and *κλίνει* (klinis), "a small bed."

Cultural Note.—The plants described below, being natives of a region lying within and near the equatorial zone,‡ require the temperature of

* Journal of Linn. Soc. loc. cit. supra.

† M. Porte, who visited the Philippine Islands a few years after our own countryman, Cuming, had made known the great orchid wealth of those islands, observed of *Platyclinis* (*Dendrochilum*), "Les *Dendrochilum* très-nombreux à une altitude de 500 à 1,000 mètres ne se rencontrent jamais dans les Philippines à une altitude moindre, attachés aux troncs des arbres à deux ou quatre mètres au-dessus du sol. Les forêts dans lesquelles on les trouve sont si humides que, pendant neuf mois de l'année, les sangsues y vivent comme si elles étaient terrestres."—Du Buysson, *L'Orchidophile*, p. 325.

‡ For climate of this zone see notes under *Dendrobium*, page 9.

what is familiarly called the East Indian house. They should be re-potted within a short time after the fall of the flowers, in a compost of peat and chopped sphagnum, such as is generally used for tropical epiphytal orchids with pseudo-bulbs. The pots should have an ample drainage of clean broken crocks to three-fourths of their depth; water must be freely supplied during the growing season, the supply being diminished in the dormant season to a quantity sufficient to keep the compost moist.

Platyclinis Cobbiana.

Pseudo-bulbs sub-conical, elongated, angulate, channelled, $1\frac{1}{2}$ —2 inches long. Leaves elliptic-lanceolate, 6 inches long. Peduncles slender, about a foot long; raceme flexuous, dense. Flowers pale straw-yellow with an orange-yellow lip; sepals and petals elliptic-oblong, acute; lip flabellate, slightly retuse in front. Column white at the apex, greenish below.

Platyclinis Cobbiana, Hemsley in *Gard. Chron.* XVI. (1881), p. 656. *Dendrochilum Cobbianum*, Rchb. in *Gard. Chron.* XIV. (1880), p. 748.

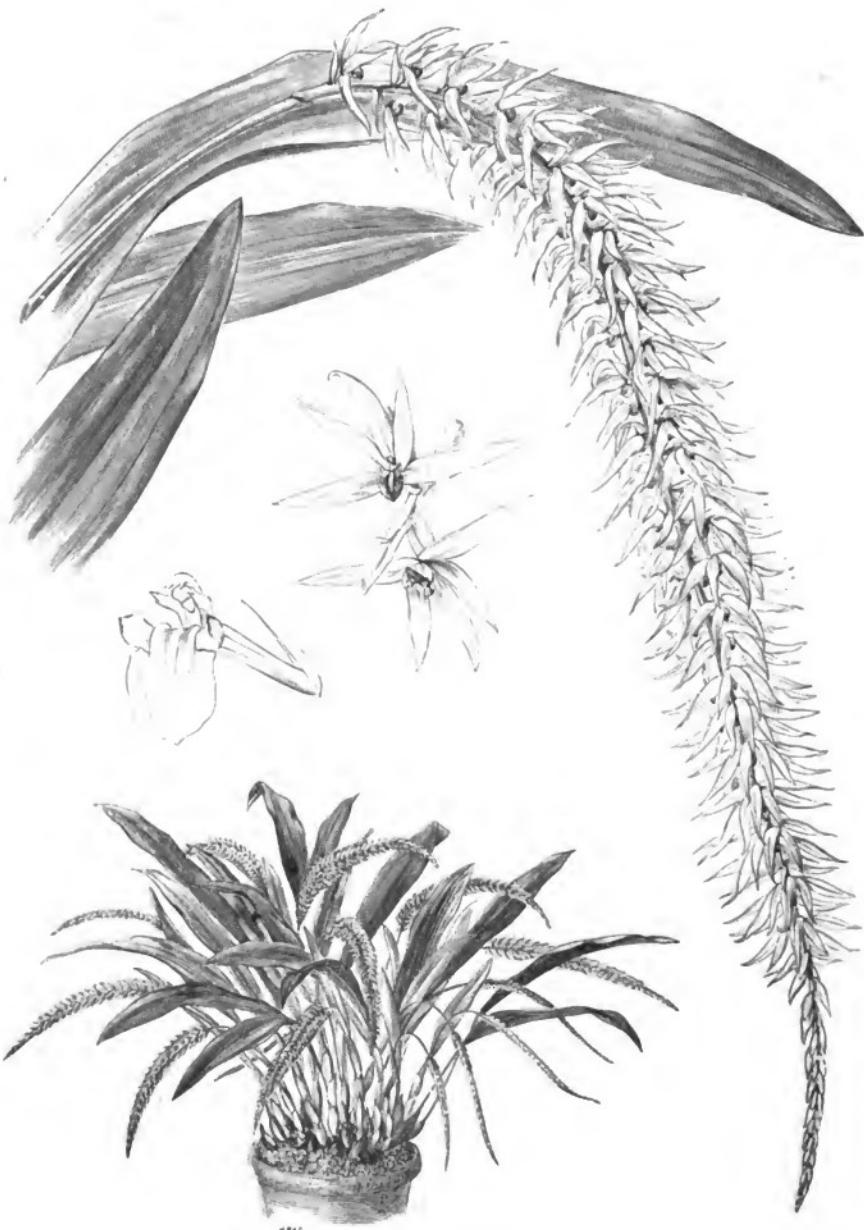
Introduced from the Philippine Islands, in 1879—80, by Messrs. Low and Co., through their collector Boxall, and dedicated by Reichenbach to Mr. Walter Cobb, of Silverdale, Sydenham, in whose collection it flowered for the first time in this country. *Platyclinis Cobbiana* is easily distinguished from the better known *P. glumacea* by its differently shaped pseudo-bulbs, its zigzag rachis, and by its flowering at the opposite season of the year, usually September and October.

P. filiformis.

Pseudo-bulbs ovoid, about the size of a filbert. Leaves linear, 5—6 inches long. Peduncles filiform, 12—15 inches long. Raceme with 50—80, or even more flowers of an uniform canary-yellow; sepals and petals oval; lip shorter than the other segments, obcordate, emarginate.

Platyclinis filiformis, Benth. in *Journ. Linn. Soc.* XVIII. (1881), p. 295, ined. *Dendrochilum filiforme*, Lindl. *Bot. Reg.* 1840, misc. No. 113. *Regel's Gartenfl.* XVIII. (1869), t. 604. *Illus. hort.* 1878, t. 323.

One of the discoveries of Cuming during his excursion to the Philippine Islands in 1836—40, and sent by him to Messrs. Loddiges. It flowered for the first time in Europe in Mr. Bateman's collection at Knypersley, in Cheshire, in 1841. Its flowering season is June and July, when, although the individual flowers are among the smallest in the orchid family, the graceful thread-like racemes in which they are collected, form a most striking and pleasing object.



Platyclinis glumacea.

P. glumacea.

Pseudo-bulbs ovoid, about the size of a small walnut, the younger ones sheathed with reddish scales which enclose also the foot-stalks of the leaves and the bases of the scapes. Leaves lanceolate, about a foot long. Peduncles filiform, bearing along the distal half a pendulous raceme of yellowish white, chaff-like flowers. Sepals and petals linear-oblong, acuminate; lip three-lobed, the side lobes pointed, the middle lobe sub-orbicular with two thickish lamellæ on the disc of a deeper yellow than the other parts of the flower.

Platyclinis glumacea, Benth. in Journ. Linn. Soc. XVIII. (1881), p. 295, ined.
Dendrochilum glumaceum, Lindl. Bot. Reg. 1841, misc. No. 58. *Bot. Mag.* t. 4853.

This was also one of Cuming's discoveries in the Philippine Islands, and was sent by him to Messrs. Loddiges about the same time as the preceding species, and in whose nursery it flowered for the first time in 1841. The gracefully pendulous crowded racemes of flowers appear in March and April, which, although of a homely colour, have a pleasant fragrance, somewhat like that of new-made hay.

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OF

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PART III.

DENDROBIUM,

BULBOPHYLLUM AND CIRRHOPELALUM.

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1888.

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PRELIMINARY NOTICE.

THIS Manual is being compiled to supply amateurs and cultivators of exotic Orchids with a fuller account of the principal genera, species and varieties cultivated under glass, than is contained in the Manuals hitherto in use.

The rapid extension of Orchid culture during the last quarter of a century, resulting from the increased taste for and appreciation of this beautiful and interesting order of plants, has, in our opinion, created the *desideratum* which we are now attempting to supply. The prominent place, too, occupied by Orchids in the columns of the Horticultural Press, and the surprising amount of practical and varied information respecting them disseminated through its agency, has also stimulated the desire to obtain all the leading facts in a condensed form, to which easy reference may at any time be made.

So numerous are the species and varieties of Orchids at present in cultivation, and to which additions are constantly being made by new discoveries and by artificial hybridisation, that the labour attending the compilation of a Manual sufficiently comprehensive to meet the wants of cultivators must necessarily demand much time. Moreover, the present unsatisfactory state of Orchidology, especially in its horticultural aspect and its complicated and unscientific nomenclature, have rendered the compilation of such a Manual within a stated time almost an impossibility.

Under these circumstances, and yielding to the solicitations of patrons and friends, we have decided upon issuing the work in parts, each part containing a monograph of the cultivated species and varieties of one of the most important genera, or of a group of genera.

Little explanation of the plan of the work is here needed; the parts as issued must speak for themselves. We have only to state that in the scientific classification and sequence of the genera we have followed, with but trifling deviations, the arrangement of Bentham and Hooker as elaborated in their *Genera Plantarum*, the most profound and, at the same time, the most intelligible exposition of the Orchideæ extant. In the nomenclature of the species, we have adhered to the Laws of Botanical nomenclature adopted by the International Botanical Congress, held at Paris in August, 1867.

In the description of the species, we have been compelled to use occasionally a few technical terms to avoid cumbrous circumlocutions; at the conclusion of the work we propose giving a glossary of the terms so used. In the cultural notes we have quoted temperatures in the Centigrade scale with the equivalent Fahrenheit readings, in the hope that the far more rational scale, now almost universally adopted in scientific investigations, may also come into use in horticulture. The literary references in italics indicate coloured plates of the species or variety described.

SUB-TRIBE DENDROBIEÆ.

Inflorescence lateral, pseudo-terminal, or a leafless scape distinct from the leaf-bearing stems. Column more or less produced beyond the point of attachment to the ovary into a kind of foot. Pollinia 4 (rarely 2), equal and parallel, in one row, and without caudicle.

DENDROBIUM.

Swartz in K. Vet. Acad. Stockh. Nya. Hand. XXI. p. 244 (1800). Benth. et Hook. Gen. Plant. III. p. 498 (1883).

The great genus *Dendrobium* unquestionably occupies the first rank among the epiphytic Orchidæ of the Old World in the estimation of the horticulturist and amateur, not only on account of the large number of its contained species, but chiefly by reason of the gorgeous colouring of the flowers of many of them, and the great delicacy and beauty of the tints of others. As a genus, the *Dendrobium*es of the Old World are, in many respects, analogous to the *Epidendra* of the New; the one may, in fact, be regarded as the representative of the other in the immense regions over which they are spread. Each genus includes several hundreds of species and varieties, amongst which there is a surprising diversity of habit, size of plant, colour of flower, etc. In both genera are found plants with dwarf-tufted pseudo-bulbs only an inch or two high producing racemes of flowers proportionately small, and others with rod-like stems upwards of 10 feet high that yield racemes of flowers whose number in the aggregate amounts to hundreds; between these extremes there is almost every possible gradation as to size. In both are found flowers of small size and of the most inattractive tints, and others of grand proportions adorned with the richest hues known. But amidst all this diversity, the flowers of all the included species in each genus possess a community of structure which proclaims their affinity and which compels the botanist to recognise in them a family connection that cannot be severed, in spite of the diversity of form seen in their organs of vegetation and in their inflorescence.

These common characters as seen in the flowers of *Dendrobiun* may be thus summarised:—

The *sepals* are nearly of equal length, the dorsal one free, the lateral two adnate to the foot of the column, and forming with it in some species a short gibbous chin; in others a longer or shorter spur.

The *petals* are generally of the same length as the sepals, but sometimes longer, often much broader, rarely narrower.

The *lip* is more or less contracted at the base into a claw, lying upon, or adnate to the foot of the column.

The *column* is produced below the point of attachment to the ovary into a kind of foot, the portion above the ovary being very short.

The *pollinia* are 4, of waxy texture, oval or oblong, compressed and lying parallel within the anther case.

The *capsule* is ovoid or oval-oblong, rarely elongated.*

Although the above diagnosis holds true, as far as it goes, for the whole genus, yet in consequence of the great diversity of form, especially in the vegetative organs, into which the genus has developed throughout the vast region over which it is spread, a diversity that can be but very inadequately comprehended from an inspection of the cultivated species even in the largest collections, it is found necessary, for scientific purposes, to divide it into sections, each distinguished by some leading peculiarity or feature observable in the species brought under it. Dr. Lindley, the first who attempted a systematic synopsis of the genus, proposed ten sections, in which he is chiefly followed by Mr. Bentham, but who reduces them to seven, subdividing the two largest of these into sub-sections. Of the seven sections of Bentham, the five undivided ones, which are, comparatively speaking, but small groups, are almost solely of scientific interest, scarcely a type or included species being known as cultivated plants in other than botanic gardens, and very few have ever been thought worthy of being figured. They are:—

1. ARORUM,† including about twelve species chiefly Malayan; of these, *Dendrobiun anceps*, figured in the *Botanical Magazine*, t. 3608, is one.

* Abridged from Bentham and Hooker. There are many deviations from the form of the fruit above described, e.g., in *Dendrobiun Dearci* it is prismaticoid.

† This and the following sectional and sub-sectional names, like many other terms used in botany, have been called into existence by the exigencies of science, and are, for the most part, arbitrary coinages from the Greek and Latin languages, whose meaning is sometimes obscure, but which have been framed to meet the case to which they are applied. Thus ARORUM is *ἄπρον*, "impenetrable," "impassable," in reference to the localities, usually dense jungle, in which the included species are found; it is the name of a genus founded by the Dutch botanist, Blume, on a Javanese species, but which, with its allies, was afterwards merged by Lindley into *Dendrobiun*. RHIZORIUM is from *ῥίζα*, "a root," and *βίος*, "life," in reference to the

2. **RHIZOBIA**, including three Australian species, of which *Dendrobium lingueriforme*, *Bot. Mag.* t. 5249, is the best known.

3. **CADETIA**, including about twelve species, spread over the great Asiatic Archipelago from Ceylon to Australia, of which the curious *Dendrobium cucumerinum*, *Bot. Mag.* t. 4619, is one.

4. **SARCOPODIUM**, a small group, including five or six Indian and Malayan species, of which *Dendrobium amplum*, figured in Paxton's *Magazine of Botany*, VII. p. 121, was one of the earliest; *D. Cologyne*, *Gard. Chron.* 1871, p. 136, and *D. Treacherianum*, *Bot. Mag.* t. 6591, are the most recent in cultivation.

6. **STRONGYLE**, a group of species, chiefly Malayan and Australian, distinguished by their branched stems and terete leaves. The typical species, *Dendrobium teretifolium*, *Bot. Mag.* t. 4711, is occasionally met with in cultivation.

The leading features that distinguish these sections will be better comprehended by reference to the illustrations quoted than from any verbal description we can give, and which would lead us beyond the limits of the task we have assigned to ourselves.

Of the two remaining sections, **STACHYOBIA**,* the fifth in order, is rather an extensive one, and is divided by Bentham into several sub-sections, of which only one contains species of any interest to the amateur cultivator of orchids; this is *Speciosæ*. The included species of this sub-section are chiefly distinguished by their rather long stems furnished with leaves near their apex at the time of flowering, but a few are leafless. The racemes are pseudo-terminal, elongated, many-flowered, the flowers generally large and showy. Among the best known Dendrobes in this sub-section are *Dendrobium speciosum*, the typical species, *D. bigibbum*, *D. superbiens*, *D. Fytchianum*, *D. mutabile*, *D. macrophyllum Veitchii*, etc.

By far the most important of the sectional divisions is the seventh and last in Bentham's classification, and called **EUDENDROBIUM** or the true Dendrobes, all of which are chiefly distinguished by their unbranched stems,† that are either leafy throughout or the leaves are confined to the top. With the exception of those species included in the section **STACHYOBIA**, all the cultivated Dendrobes may be said to

habit of the included species which are stemless. **CADETIA** is probably from *cadere*, "to fall," in reference to the leaves, that are usually short-lived in the species included in this section. **SARCOPODIUM** is compounded of *σάρξ*, *σαρκός*, "flesh," and *ποδός*, *ποδῆς*, "a foot," in reference to the fleshy pseudo-bulbs or stems of the included species. **STRONGYLE** is from *στρογγύλος*, the Greek equivalent nearly for the Latin *teres*, "round," in reference to the terete leaves of the included species.

* From *στραχύς*, "a spike" or raceme, in reference to the form of the inflorescence.

† *Caules indivisa apice vel undique foliati*, Gen. Plant. III. p. 500. But this is not strictly true; many Dendrobes in this section emit lateral shoots from the uppermost joints of the stems, which in time produce at their base a fascicle of aerial roots. When the shoots are mature, they may be detached with their roots from the parent stems as independent plants.

belong to this very extensive group, and which is also subdivided for scientific purposes into sub-sections, a subdivision which also has its uses in the practical work of the cultivator.* We therefore note the leading characteristics of the four principal sub-sections of *EUDENDROBIUM*, the fifth and remaining one containing no species of interest to the amateur.

Pycnostachye.† Racemes dense, lateral or subterminal; flowers numerous, crowded, small, with the spur usually elongated. *Dendrobium secundum* is the typical species of this sub-section, which also includes *D. cumulatum* and a few others.

Formosae.‡ Flowers showy and large, usually white, rarely pale yellow, in loose clusters crowded at the top of the stem. This sub-section is popularly known as the *nigro-hirsute*, on account of the young shoots of many of the included species being clothed with short black hairs, such as *Dendrobium formosum*, *D. Infundibulum*, *D. Draconis*, *D. Lowii*, *D. cariniferum*, etc.

Calostachye.§ Flowers often showy, produced in loose, more or less elongated lateral racemes. It includes *Dendrobium chrysotoxum*, *D. Farmeri*, *D. Brymerianum*, *D. fimbriatum*, *D. moschatum*, *D. thrysiflorum*, and other popular kinds.

Fasciculata.¶ Flowers often showy, produced in lateral fascicles of two and three, and not infrequently solitary from the leafless stems, but sometimes from the leafy ones as in *Dendrobium ochreatum*. A numerous group, including very many favourite species, as *D. nobile*, *D. aureum*, *D. crassinode*, *D. Bensoniae*, *D. Devonianum*, *D. lituiflorum*, *D. Wardianum*, etc., etc.

The vegetative organs of the Dendrobes have been so frequently referred to in the foregoing sketch of the classification of the species, that but little remains to be stated respecting them. The following diagnosis refers almost exclusively to those met with in the orchid collections in this country.

The cultivated Dendrobes are tufted plants consisting of stems springing from a slowly-creeping woody rhizome, from which are emitted dense fascicles of thread-like roots that spread over and cling tenaciously to the bark of trees, or to the rocks to which the plants are attached.

The stems are cylindric, club-shaped, rod-like, or even pseudo-bulbous, generally terete, but sometimes angulate, compressed or furrowed, especially

* The utility of adopting a scientific division of the Dendrobes for cultural purposes was first recognised by the late J. C. Spyers. See *The Gardener* for February, 1882, but the divisions sketched by him do not quite correspond to those in the text.

† From πυκνός, "dense," and σταχύς, "a spike" or raceme.

‡ Formosus, "beautiful in form."

§ From καλός, "beautiful," and σταχύς, "a spike" or raceme; this subsection includes *Dendrocoryne* (club-stemmed Dendrobes) of Lindley.

¶ *Fasciculata*, "in bundles," from *fasciculus*, "a small bundle."



when old. They are either pendulous, nodding, or erect; in some species but a few inches in height, in others attaining a length of several feet; they are always jointed, the joints being often more or less swollen and the internodes clothed with the persistent sheathing bases of the fallen leaves, which are greyish white and striated longitudinally.

The *leaves* are usually of ovate-oblong shape, or of some modification of that form; they are distichously and alternately arranged along the stems, in which case they are either deciduous or of biennial duration; or they are confined to the tops of the stems, when they are usually persistent several years.

The *inflorescence* is lateral or pseudo-terminal. In the deciduous species, the flowers are produced singly, or more commonly in fascicles of twos and threes from the joints on the side opposite the leaf or where the leaf had been. In the evergreen species the inflorescence is more decidedly racemose, and the racemes are produced from the stems below the leaves three or more years in succession.

It is scarcely necessary to add that the simple facts stated above respecting the vegetation of the Dendrobes should be noted by the cultivator, as they have an important bearing on the successful treatment of the plants, as will be presently pointed out.

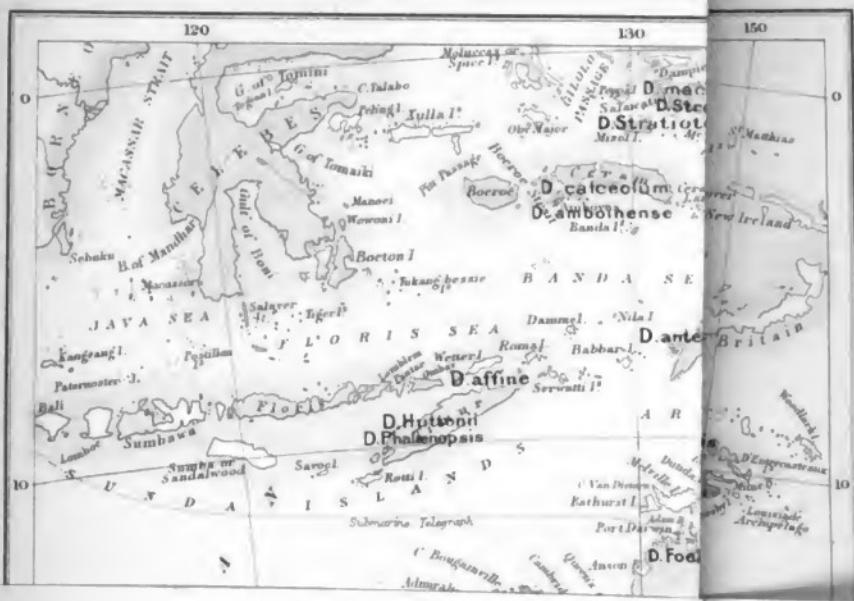
The genus Dendrobium was founded by Oloff Swartz, a Swedish botanist, one of the immediate successors of Linnaeus, in Sweden, and in whose University, Upsal, he graduated. In the Transactions of the Royal Academy of Science, of Stockholm, for 1800, Swartz published a synopsis of the orchids known to him, establishing several new genera, including Dendrobium, under which he describes nine species; upwards of 300 species are now included in the genus. The name is derived from δένδρον (dendron), "a tree," and βίος (bios), "life," hence it is almost synonymous with Epidendrum.

The Dendrobes are spread over an immense area in south-east Asia, the Malayan Archipelago, Australia and the Islands of the Western Pacific, a region that cannot be very clearly defined, but which may be roughly stated to lie between the 28th parallel of north and the 40th of south latitude, and between the 80th and 160th meridians of east longitude. Beyond these limits there are outlying members in Southern India, Japan, the Society Islands, New Zealand, and in some other places. Within this portion of the globe, all the general phenomena of the climate of the tropics occur, but vast as is the region above sketched, it is a curious fact that nearly all the Den-

drobæs that find favour with amateurs are confined to a comparatively small portion of it, in which the climatic phenomena and conditions, though by no means uniform, are very similar throughout. This portion of the Dendrobium region may be best delineated as a zigzag belt of variable width, that commences at the western limit of distribution among the lower ranges of the Nepalese Himalayas, at about the 80th meridian, E. (the most westerly species, so far as we have been able to ascertain, being *D. amænum*), thence extending eastwards through Assam into Southern China; from Assam it turns southwards through Indo-China, where the Dendrobæs appear to be confined chiefly to that portion of the peninsula which lies west of the mountain chains dividing the watersheds of the Irawaddy and Menam valleys, being most abundant in southern Burmah and the adjacent province of Moulmein, which is the richest Dendrobium district known. Southwards from Moulmein the number of known species diminishes rapidly, owing perhaps more to the fact that a great part of the peninsula south of Tavoy not having yet been sufficiently botanically explored, than to the absence of Dendrobæs. From the southern extremity of the island of Sumatra, the belt turns eastwards, extending through and including nearly the whole of the great Malay Archipelago as far as New Guinea, over which is scattered a large number of Dendrobæs, but most of them with small inconspicuous flowers. From New Guinea it again turns southward, embracing but a narrow strip along the east coast of Australia as far as Cape Howe. Nearly the whole of the Dendrobæs described in the following pages occur within the comparatively narrow limits here sketched, the exceptions being from Southern India, Ceylon, the Philippine Islands and Japan.

The maps must be accepted as an attempt only to illustrate fairly the geographical distribution of Dendrobium; hence the following explanation respecting them is rendered necessary. As stated above, the distribution of the genus is somewhat peculiar; thus, in Assam (including the Khasia Hills), Moulmein and Java, a large number of species are crowded together within a comparatively small area, so that it is impossible to insert their names in type sufficiently clear within the limits of the area in which they occur; for this reason, the Moulmein Dendrobæs, on account of the horticultural importance of the greater part of them, are given in a marginal list. The Javanese Dendrobæs, upwards of sixty in number,* having no such

* *Fide* Miquel. Fl. Ind. Bat. III. 629—635



importance, are purposely omitted, with the exception of six of the best known. With respect to the species found in northern India and Assam, their habitats have been so vaguely reported—in nearly every case simply Nepaul, Assam, etc.—that their geographical position as indicated on the map, may by no means be the precise one they should there occupy; nor do they probably occur in the somewhat formal sequence as regards locality in which their names have been necessarily placed. Moreover, the existing confusion in the orthography of Indian names has made it impossible to determine, on modern maps, the localities of many species given by the older botanists. Widely distributed species, as *aureum*, *crumenatum*, *formosum*, *secundum*, etc., are inserted more than once, but always in localities in which they are known to occur. The few species reported from New Guinea are assumed to have been found in the best known or Dutch division of the island, except those recently gathered on the Owen Stanley range of mountains in the extreme south-east. The names of many Dendrobes of botanical interest only are inserted because their habitats are well authenticated; this is especially the case with the Australian species, the majority of which occur in an almost uninterrupted belt along the east coast. The names of a few species prized by amateurs are omitted on account of the total absence of reliable information respecting their habitats, or because their native countries lie without the range of the maps.

The climate of the Dendrobium region is characterised by a high average temperature, accompanied with great moisture throughout the greater part of the year, the Australian portion of it being a partial exception that will be presently noted. In the lower Himalayan zone the temperature ranges from 27°—33° C. (80°—90° F.), and even higher in the enclosed valleys, while the sun is at and near the summer solstice; but at the opposite season it is from 6°—9° C. (10°—15° F.) lower. The humidity of the atmosphere during the greater part of the year is near the saturation point, owing to the enormous amount of vapour which ascends from the Bay of Bengal being drifted towards the mountains, and which, being condensed by contact with the higher and colder zone, is precipitated as rain into the lower valleys. This precipitation increases in amount in proceeding eastwards to the Khasia Hills, where it attains a maximum, as much as 600 inches having been registered in one year, and of this enormous quantity a fall of 250 inches of rain has been known in one month (August).* This excessive fall is, however, quite local. At Sylhet,

* Hooker's Himalayan Journals, II. p. 283.

thirty miles further south, with a mean maximum temperature of 27° C. (80° F.), and a mean minimum of 15° C. (60° F.), the annual rainfall is less than half, while in some parts of Assam it scarcely exceeds 100 inches.* In other parts of Assam, however, the annual rainfall is very considerable. In the Cachar district, one of the chief centres of the Tea plantations, over 150 inches have been registered in one year. The wettest months are from June to September, the greatest precipitation occurring in July, during which month from 35—40 inches usually fall, the greatest amount observed in one day being from 5½—6 inches. From the middle of October to near the end of February the season is rainless, and there is thence a decided rest in the vegetation. The day temperature of the district from March to September ranges from 24°—33° C. (75°—90° F.) ; the night temperature is generally about 5½° C. (10° F.) lower. In the dry season (November—February) the day temperature is from 5½°—8° C. (10°—15° F.) lower, while the lowest observed night temperatures ranged from 7°—10° C. (45°—50° F.). Dendrobes are abundant in the district, growing chiefly on trees in the forest jungle at various heights from 10 up to 50 feet, but always above the low, dense under-growth where they are exposed to the influence of the atmosphere.

In the plains of Burmah, about Prome and Thayetmyo, which lie beyond the extreme influence of the S.W. monsoon, the temperature frequently rises to 43° C. (110° F.) in the shade, but the average mean is not much above 27° C. (80° F.) ; the annual rainfall is from 100—150 inches. In Rangoon and Moulmein—both in the plains and on the mountains—the influence of the S.W. monsoon is more decided, although its force is broken by the Arracan Mountains. In the plains, the mean temperature is about 27° C. (80° F.), and the rainfall from 150—200 inches in one year; but on ascending the mountains, while there is a gradual diminution of temperature, the precipitation remains the same or slightly on the increase. Thus, on the Arracan mountains at 1,500—2,500 feet elevation, in the localities of *Dendrobium crassinode*, *D. crystallinum*, *D. chrysotoxum*, *D. Farmeri aureum*, and some others, Colonel Benson estimated the average temperature to be about 24° C. (75° F.), although in clear nights by rapid radiation it descends to below 10° C. (50° F.) just before sunrise. At this elevation the annual rainfall is about 90 inches. In addition to the heavy rainfall, the moisture on the mountains of Moulmein and Arracan is always very great, on account of the mists and clouds that frequently envelop them. The dry season of this region is from December to the middle of March, which is the season of rest for the orchids. During this season the trees lose their leaves, the jungle grass is withered up, and up to an elevation of 1,500 feet, the whole country has a scorched and desolate appearance.† The temperature then rises to 49° C. (120° F.).

* Hooker's Himalayan Journals, II, p. 284. † Gard. Chron. 1870, p. 796.

Approaching the equator the climatal phenomena become more equable. Within the equatorial zone, or that portion of the earth's surface that extends to about 12 degrees on each side of the equator, a space that includes the whole of the Malay region, the most characteristic feature of the climate is the wonderful uniformity of its temperature alike throughout the changes of day and night, and from one part of the year to another. As a general rule the greatest heat of the day does not exceed 32°—33° C. (90°—92° F.), while it seldom falls during the night below 23° C. (74° F.). It has been found by hourly observations carried on for three years at the meteorological observatory at Batavia, that the extreme range of temperature in that period was only 15° C. (27° F.), the maximum being 35° C. (95° F.), and the minimum 20° C. (68° F.). The usual daily range of the thermometer is, on the average, only a little more than 5° C. (about 10° F.).* During a large part of the year, the air of the equatorial zone is nearly saturated with vapour, and, owing to the great weight of vapour, its high temperature enables it to hold in suspension, a very slight fall in the thermometer is accompanied by the condensation of a large absolute quantity of atmospheric vapour, so that copious dews and heavy showers of rain are produced at comparatively high temperatures and low altitudes. The yearly rainfall at Batavia is 78 inches. During the wet months of the year, it is rare to have many days in succession without some hours of sunshine, while even in the driest months there are occasional showers.†

Although northern Australia is situated within the tropical region, the rainfall is there more restricted, and the amount diminishes in proceeding southwards; in many places even near the east coast, where the precipitation is greatest, it scarcely exceeds the average annual fall in many parts of England; but on the eastern slopes of the coast ranges of Queensland, the rainfall is more copious, and there accordingly the Australian epiphytal orchids attain their greatest development.

The greater part of the Philippine Islands being within the equatorial belt, they are subject to nearly the same climatic phenomena as the islands of the Malay Archipelago. Ceylon, however, although situate within the equatorial zone, possesses two distinct climatic regions: the smaller south-western portion, which is separated from the larger north-eastern portion by the mountain system of which Adam's Seat is one of the highest summits, has a climate that agrees in the main with that of the equatorial belt; whilst the larger north-eastern portion is subject to long droughts, and has a greatly diminished annual rainfall; in this portion orchids are almost entirely absent.

Cultural Notes.—The facts stated above relative to the climate of the region in which the Dendrobes have their home, supply *data* for the guidance of the cultivator, but not the *rule* to be followed. They simply teach him that as regards temperature there is a lower limit

* Wallace's Tropical Nature, p. 4.

† Idem. pp. 15—18.

below which the plants would languish and even perish if subjected to it beyond a period of limited duration; and a higher range which it would be most injudicious to attempt to reach by artificial means; that the plants have alternate seasons of active growth and comparative, if not complete repose, and that during the former they are immersed in an atmosphere always highly charged or even saturated with moisture. As is well known, and from causes that will be occasionally specified in this work, it is impossible to produce in a glass structure, whatever may be its dimensions, even an approximate imitation of climatic conditions, such as are provided by Nature in distant lands, and to which the plants indigenous to those lands are adapted. This is well seen in the case of the four great essentials of epiphytal plant life: thus *moisture* must be supplied entirely by artificial means; the requisite *heat* is maintained chiefly by artificial means too; *light*, especially direct sunlight, except for a short time at midsummer, is present in such diminished intensity as scarcely amounts to in the aggregate during the year to much more than one-half of what it is at the equator; lastly, the quantity of *fresh air* admitted through the ventilators is entirely dependent on the external conditions of the atmosphere. So great is the effect of the altered conditions of the interior of a glass structure upon the tissues of the vegetative organs of the orchids confined in them, that if, after a few years' sojourn there they were taken back to the country of their birth, in however healthy a state they might appear to be, and affixed to the stems and branches of trees or set in any such position as their progenitors grew and flourished, or from which they themselves were originally taken, the probability is very great that they would perish during the first dry season through which they would have to pass. In the hot plains of Moulmein and Lower Burmah, during the dry season, the stems of the native Dendrobes are literally scorched by the blazing sun, and shrivel to half their ordinary size, while during the wet season they are drenched with torrents of rain.* Hence, while a knowledge of the climate of the native countries of orchids and their environment there, is of the highest value to the cultivator, it is still more necessary that he should supplement it with that of the experience gained by the best cultivators—an experience that has taken a long series of years to acquire.

We will now summarise the principal points to be attended to in the cultivation of Dendrobes.

Where a collection is grown, of which the aggregate number of plants is considerable, whether the number of species they represent be few or many, it is best to devote a house or compartment of a house mainly to them, for greater convenience of manipulation. Dendrobes may, however, be grown with other East Indian orchids if care be taken to remove them from the hotter and damper part of the house where they

* Col. Benson, in Gard. Chron. 1870, p. 796.

have made their season's growth, to the cooler and drier part where they can have a period of rest, which can be promoted by withholding water, or what would be better still, into an early viney, if such accommodation is at hand. The chief requirements of a Dendrobium house are, that it should be sufficiently lofty to allow room for the development of the stems of those species which have them long, and to admit of an easy circulation of a large body of air within, by means of ample ventilation; that the heating apparatus should be powerful enough to maintain the required temperature in all seasons; that the middle stage—if the house is span-roofed—should be raised high enough to bring the plants placed upon it as near the light as possible; that it should be provided with a tank beneath the stage sufficiently capacious to hold as much rain-water as may be required for the service of the house; and with strong iron rods affixed to the rafters, from which baskets, rafts, blocks, pans, etc., may be suspended.

Temperatures.—In consequence of the drying and thence exhausting effects in plant houses of the heat given out by radiation from iron pipes filled with hot-water, it should always be the aim of the cultivator to maintain no higher temperature by that means than is absolutely necessary to secure the well-being of the plants. The range of temperature to be maintained by hot-water pipes that is best suited for any particular class of plants can only be ascertained by experiment and observation; hence, for Dendrobiums it has been found that in the climate of London, from November to February the night temperature of the house in which they are cultivated should not descend below 13° C. (55° F.), with a rise of about 3° C. (5° F.) during the day. During March and April, when most Dendrobiums start into growth, the night temperature may range from 15°—18° C. (60°—65° F.), with a rise of 3°—5° C. (5°—9° F.) by day, by fire-heat alone; but with sun-heat it may rise from 6°—9° C. (11°—16° F.) above the night temperature. During the summer months, that is, from May to August, when growth is most active, the night temperature may be raised to 18° C. (65° F.), with a rise of 3°—5° C. (5°—9° F.) by day, by fire-heat, or even 6°—9° C. (11°—16° F.) by sun-heat. During September and October, when the plants will be finishing their season's growth, the temperatures may be reduced to those of March or April. Excessive temperatures can always be reduced by careful ventilation.

Watering.—The frequency and amount of watering must depend on the season of the year and the condition of the plants, whether they are in active growth or at rest. General directions may be given as a guide, but much must be left to the judgment of the cultivator. Thus, in the winter months, when the plants are at rest, water should be given only often enough to keep the compost and surface moist, and prevent the latest formed stems from shrivelling, the amount being gradually increased as the young shoots appear; but when the

new growths begin to emit roots, the plants must be liberally supplied with water daily till they have completed their growth, when a diminution in quantity should be gradually made until the plants are again at rest; and so with the sprinkling of the floors, stages, side-walls, etc., with water, or "damping down," as it is called. While in the winter and during cold weather, once or twice a week may be found sufficient to maintain the plants in health, in the spring months the sprinkling must be performed daily, or even oftener, according to the state of the weather, till on hot summer days three or even four times a day will not be found too much. A corresponding diminution in frequency must be made during the declining months of the year till winter again comes round.

Ventilation.—This must be regulated according to the conditions of the external atmosphere. The rule is—give as much top and bottom ventilation as possible, provided no direct draught is caused thereby. During the summer months, and at all other times when the temperature of the external air is above the freezing point, there should be a gentle current passing through the lower ventilators, both day and night when possible. When, as is sometimes the case in spring, bright sunshine and cold winds occur contemporaneously, the ventilators must be so regulated as to prevent a strong draught, as well as too close an atmosphere within.

Shading.—No shading is required from the middle of October to the middle of March, when, on bright days, a slight shading may be used for an hour or two before and after mid-day. As the sun approaches the northern tropic, the time during which the shading should be used must be gradually extended, till in June and July, on hot bright days, the house should be shaded from six to seven hours, more or less, according to its position (orientation). From August to October the duration of shading may be diminished with the advance of the season.

Potting, etc.—The species included in the sub-section *Fasciculata*, which are chiefly those with pendulous stems and deciduous foliage, should be grown in teak baskets or, while the plants are small, in shallow pans, or even in pots, if convenience demands such an arrangement, there being an attachment of wire by which they can be suspended near the roof-glass of the house. In each case, a layer of clean crocks should be placed at the bottom, then more crocks mixed with pieces of charcoal; the remaining space, which should not exceed two inches in depth, should be filled with a mixture of sphagnum and fibrous peat in equal proportions, and in this the plants should be set, being held firmly in their place by wire or strips of raffia if needed. Plants that are unstable in their rooting material take a long time to get established.

The evergreen species, especially those belonging to the sub-section *Calostachyæ*, and with which should be included, for cultural purposes,

those with sub-evergreen foliage, as *Dendrobium nobile*, *D. Linawianum*, etc., may be grown in pots. The pots should be filled to two-thirds of their depth with clean broken crocks for drainage, which should be secured by a layer of sphagnum; the remainder must be filled with compost (sphagnum and peat) mixed with a sprinkling of small broken crocks and charcoal to facilitate drainage. In potting, the base of the plant should stand above the rim of the pot, and no portion of the stems should be buried in the compost, which should be pressed firmly around the base but not rammed down. The plants may be made secure in their place by sticks.

It is well to note here that the *Calostachya* group, *Dendrobium densiflorum*, *D. Farmeri*, *D. thyrsiflorum*, *D. chrysotoxum*, *D. suavissimum*, etc., etc., take a longer season of rest than many others; these Dendrobes are late in starting into growth, but when once started their growth is rapid. The watering of these plants must thence be regulated accordingly.

The *Formosae (nigro-hirsute)* group has, with the exception of a few of its included species, proved less tractable under cultivation than most other Dendrobes. The typical species, *D. formosum*, as may be implied from the localities it affects in a wild state, is a heat-loving plant. It may be grown in a pot or basket, or even on a bare block of wood, where it has the advantage of more closely imitating the manner in which it grows in its native country—an advantage, however, that is more than counterbalanced by drawbacks, such as deficiency of moisture, etc. *D. Infundibulum* and its variety *Jamesianum*, coming from a higher altitude, will grow and flower in a lower temperature; the cool end of the Cattleya house, for example, will do for them, or still better, the Odontoglossum house.

The Australian Dendrobes, included in the sub-section *Speciosae*, require but a very little lower temperature than the East Indian species, especially those from North Australia, as *D. bigibbum*, *D. Phalaenopsis*, *D. superbiens*, etc., but as much light as possible. Notwithstanding the drier climate of Australia, they are found to require in the glass houses of Great Britain a copious supply of water while growing, and even when at rest, the compost in which they are planted should never be otherwise than moist.

The best time to re-pot or re-basket Dendrobes is when the new growths are starting, which usually occurs within a short time after flowering. Like all other orchids cultivated in glass structures, Dendrobes are subject to the attacks of insect pests, from which they must at all times be kept as free as possible. Plants attacked by red spider should be dipped into tobacco-water or some similar insecticide, or syringed with sulphur water; mealy bug and scale may be kept under by frequent sponging; yellow and black thrip can be checked by fumigation, but this remedy should be applied lightly and frequently, that

is to say, the house should be only moderately filled with smoke in the evening, and again on the following morning, or the operation may be repeated on consecutive evenings till the thrip has disappeared; too much smoke at one time is injurious to the foliage, and causes the loss of many leaves, and consequently a check to the growth of the plants.

SYNOPSIS OF SPECIES AND VARIETIES.

Dendrobium aduncum.

STACHYOBIA—Speciosæ. Stems slender, pendulous, 18–24 inches long. Leaves elliptic-lanceolate, acute, $2\frac{1}{2}$ –3 inches long. Flowers about an inch in diameter, either solitary or in short racemes, pale rose suffused with white; sepals and petals nearly similar, the former ovate, acute, the latter oblong; lip clawed with an ovate, concave blade, terminating in a hooked tip. Column bearded; anther deep purple.

Dendrobium aduncum, Wallich, MS. *file* Lindl. Bot. Reg. 1842, misc. 62. *Id.* 1846, t. 15. *Bot. Mag.* t. 6784.

First sent by Dr. Wallich to Messrs. Loddiges' Nursery at Hackney, in 1842; a few years later it was received at the Exeter Nursery from Thomas Lobb, and subsequently (in 1868) it was sent to the late Mr. John Day, from Assam, by his nephew, Captain W. J. Williamson. Quite recently (1883) it was discovered by Mr. Charles Ford, Superintendent of the Botanic Garden at Hong Kong, during an excursion which he made to the Lo-fau-shan Mountains in China, near the coast opposite the island, and where he collected plants which he transmitted to the Royal Gardens at Kew. The specific name *aduncum*, "hooked," probably refers to the hook-like apiculus of the lip.

D. æmulum.

STACHYOBIA—Speciosæ. Stems terete, 2–4 or more inches long, "sometimes tapering into a long thin base with a small pseudo-bulb," and bearing at their summit 2–3 very coriaceous ovate-oblong or elliptic-oblong leaves. Racemes terminal, both from leafless and leafing stems, lax, 5–7 flowered. Flowers $1\frac{1}{2}$ inches across, fragrant, white, the apical half of the segments sometimes stained with pale yellow, the side lobes of the lip spotted with rose-pink; sepals narrowly lanceolate; petals linear; lip very short, three-lobed, with three greenish raised plates between the side lobes, merging into a single broad one on the middle lobe; side lobes acute, middle lobe reflexed.

Dendrobium æmulum, R. Br. Prod. Fl. Nov. Holl. p. 333 (1810). *Bot. Mag.* t. 2906 (1829). Benth. Fl. Austr. VI. p. 282. Fitzgerald's Austr. Orch. I. Part 2, t. 5.

First sent from New South Wales, in 1823, by Allan Cunningham, to the Royal Gardens at Kew, and occasionally imported since that date with other Australian orchids. It occurs in several localities near the east coast, especially in Macquarie County, south of the Macleay or Hastings river, often on the trunks and among the higher branches of lofty trees, such as the Iron-bark Eucalyptus (*E. siderophloia*), *Doryphora Sassafras*, etc., flowering in September. Although not to be compared with the gorgeous East Indian Dendrobes usually cultivated, its chaste, fragrant flowers, produced in profusion in the early months of the year in the orchid houses of Europe, should preserve it from neglect.

D. aggregatum.

EUDENDROBIUM—*Calostachys*. Pseudo-bulbs clustered, ovate-fusiform, angular, about 2 inches long, monophyllous. Leaves oval-oblong, $2\frac{1}{2}$ —3 inches long and 1 inch broad. Peduncles drooping, slender, loosely racemose, 7—12 flowered. Flowers primrose-yellow when first expanded, changing with age to orange-yellow with a deeper disc on the lip; sepals ovate; petals sub-orbicular, as broad again as the sepals; lip transversely oblong, with a short claw and pubescent disc. Column short, coloured like the perianth.

Dendrobium aggregatum, Roxb. Fl. Ind. III. p. 477 (1832). Bot. Reg. t. 1695 (1834). Paxt. Mag. Bot. VI. p. 145 (1839). Bot. Mag. t. 2643.

Dendrobium aggregatum belongs to the small group with one-leaved pseudo-bulbs, in which the inflorescence proceeds from the axil of a scale on the side of the pseudo-bulb.* It was discovered by Pierard in the early part of the present century on the northern border of Arracan, growing on trunks of *Lagerstramia Regiae*; it is now known to be widely distributed throughout Burmah, the best forms being found on trees among the low ranges of hills north of Akjao. Quite recently it has been found by Mr. Charles Ford on the Lo-fau-shan Mountains in southern China, growing on *Celtis japonica*. It was introduced by the Horticultural Society of London, and flowered for the first time in this country in the collections of Mr. Harrison, at Liverpool, and Mr. Bateman, at Knypersley, in 1834. Its flowering season is March and April; its specific name refers to its clustered, crowded pseudo-bulbs.

Cultural Note.—*Dendrobium aggregatum* is best cultivated on a bare block. Plants affixed to blocks cut from the elm, thorn, maple, &c., have been known to flower annually for many years.

* Hensley in Gard. Chron. XVI. (1881), p. 625.

D. albo-sanguineum.

EUDENDROBIUM—*Fasciculata*. A robust erect plant. Stems sub-cylindric, 6—12 inches high and about half-an-inch thick. Leaves linear-lanceolate, 6 inches long. Peduncles from near the apex of the stems, about as long as the leaves, 2—3 flowered. Flowers nearly 3 inches in diameter, pale buff-yellow with two large maroon-purple raised blotches at the base of the lip; sepals oblong-lanceolate; petals oblong-oval, as broad again as the sepals; lip with a broad claw and broadly obovate blade; spur short, funnel-like. Column very short.

Dendrobium albo-sanguineum, Lindl. in *Paxt. Fl. Gard. II.* p. 93, t. 57 (1852). Van Houtte's *Fl. des Serres*, VII. t. 721. *Bot. Mag.* t. 5130.

Introduced by us from Moulmein, in 1851, through Thomas Lobb, who found it on the hills near the Atran river; it occurs in several parts of Burmah, almost always on the tops of the highest trees. It flowers in April and May from one and two-year old stems; its large flowers, produced in twos and threes, are among the most striking in the genus.

D. amboinense.

EUDENDROBIUM—*Fasciculata*. "Stems jointed, tetragonal below, bulbiform at the very base, four to six-angled above. Leaves terminal (?), oblong, acute. Flowers in pairs, large; sepals and petals spreading, cream-white, linear-lanceolate (nearly 3 inches long in the drawing); lip small in proportion to the rest of the flower, concave, scarcely spurred at the base, yellowish, edged with a dark purple line, three-lobed, the lateral lobes broad, ovate, obtuse, incurved over the column, the middle lobe subulate; the disc ocellated with minute dark orange spots, and having a fleshy *tuberacle* near the base and two lesser pairs of *tubercles* nearer the middle lobe."—*Botanical Magazine*.

Dendrobium amboinense, Hook. in *Bot. Mag.* t. 4937 (1856). Van Houtte's *Fl. des Serres*, t. 1211 (copied from *Bot. Mag.*).

Discovered by Henshall, in Amboyna, and introduced by Messrs. Rollisson, in whose nursery at Tooting it flowered in June, 1856; it seems to have disappeared from cultivation shortly afterwards. "This remarkable plant, and one of the most singular of the genus," is preserved from oblivion by the plate and description in the *Botanical Magazine*; the notice of it here may also help to keep it in remembrance and to stimulate a desire for its re-introduction.

D. amethystoglossum.

EUDENDROBIUM—*Calostachyæ*. Stems robust, 2—3 feet high, and nearly an inch thick, but sometimes much shorter and less robust. Leaves sessile, oval-oblong, sub-acute. Racemes 3—5 inches long, many-

flowered. Flowers about an inch in diameter, crowded, ivory-white, except the anterior lobe of the lip, which is bright amethyst-purple; sepals and petals similar and sub-equal, ovate-oblong, acute; lip elongate, linear-spathulate, apiculate, convex at the middle, and incurved at the margins except towards the apex; spur long obtuse. Column exposed.

Dendrobium amethystoglossum, Rchb. in Gard. Chron. 1872, p. 109. *Bot. Mag.* t. 5968.

Introduced by us in 1872 from the Philippine Islands, through M. Gustav Wallis, who sent a single plant mixed with *Dendrobium taurinum*. It has recently been re-imported in restricted numbers, so that it may be presumed to be a rare species. Its beautiful racemes of white and purple flowers, which appear in January and February, offer a striking contrast to the inelegant habit of the plant.

D. amœnum.

EUDENDROBIUM—*Fasciculata*. Stems slender, 12—18 inches long, with internodes 1½—2½ inches long. Leaves linear-lanceolate, acuminate, 3—4 inches long, deciduous. Flowers about 2 inches in diameter, usually solitary, sometimes in twos and threes; sepals and petals ovate-lanceolate, white, tipped with amethyst-purple; lip with a convolute claw and broadly ovate limb, minutely notched at the margin, and pubescent towards the base, amethyst-purple bordered with white, and with a yellow blotch near the base.

Dendrobium amoenum, Lindl. Gen. et Sp. Orch. p. 78 (1831). *Bot. Mag.* t. 6199. Gard. Chron. III. (1875) p. 305.

One of the first Dendrobes known to science, it having been discovered in Nepaul by Dr. Wallich, who communicated it to Dr. Lindley in 1828; but one of the latest brought under cultivation, it having been sent to Mr. Bull, of Chelsea, so recently as 1874, by Major-General Berkeley, who found it growing on trees on the low ranges of hills between Dhera Dhoon and Mussooné (Himalayas), where the climate is temperate the whole year round, with hoar frost in winter. Its flowers are of medium size, but they emit a delightful violet fragrance, which will secure for the plant a place in many collections; it flowers in the summer months.

D. Aphrodite.

EUDENDROBIUM—*Fasciculata*. Stems 6—12 inches long, swollen at the joints. Leaves linear-lanceolate, 2—3 inches long, deciduous. Flowers 2 inches across, solitary or in pairs from the uppermost joints; sepals lanceolate, pointed, cream colour; petals ovate, broader than the sepals but coloured like them; lip sub-rhomboid, clawed, obscurely three-lobed, the small side lobes incurved, the middle lobe large, saffron-

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yellow, with the interior edge cream colour, and with two maroon-purple blotches at the base; spur short and obtuse; anther case purple.

Dendrobium Aphrodite, Rchb. in *Bot. Zeit.* 1862.* *D. nodatum*, Lindl. in *Gard. Chron.* 1862, p. 717. *Bot. Mag.* t. 5170. *Van Houtte's Fl. des Serres*, t. 1582.

One of the numerous discoveries of the Rev. C. Parish, in the Moulmein district of British Burmah, and introduced by Messrs. Low and Co., of Clapton, in 1862. It is found on the tops of the highest trees in company with *Dendrobium albo-sanguineum*. Its flowering season is July and August in the orchid houses of Europe.

D. *aqueum*.

EUDENDROBIUM—*Fasciculata*. Stems 12—20 inches long, decumbent, stoutish, yellowish-green when young. Leaves ovate-oblong, acute, 3—5 inches long. Flowers solitary or in pairs, produced along the distal half of the current season's growth, but not all appearing at the same time, cream-white except a yellowish disc on the lip; dorsal sepal elliptic-oblong, acute, lateral sepals sub-triangular, falcate; petals broadly ovate, spreading; lip sub-rhomboid, obscurely three-lobed, the lateral lobes small, erect, the middle lobe deflexed, with the upper surface downy and the margin ciliolate.

Dendrobium aqueum, Lindl. in *Bot. Reg.* 1843, t. 54. *Bot. Mag.* t. 4640. *D. album*, Wight, *Icon. Pl. Ind. or.* t. 1645 (1852). *Paxt. Fl. Gard.* II. p. 175.

Introduced by Messrs. Loddiges, from Bombay, in 1842. Its habitat is on the Nilghiri Hills, in southern India, where it was gathered a few years afterwards by our collector, Thomas Lobb, and quite recently by Major-General E. S. Berkeley, who found it "growing in great quantities on the extreme tops of Coffee bushes of deserted plantations." In this part of the Western Ghauts the rainfall is excessive, as much as 10 inches a day during many successive days having been noted. It usually flowers in August or September. The species was named *aqueum* by Dr. Lindley, on account of "its pale green watery flowers," an expression that scarcely does them justice.

D. *arachnites*.

EUDENDROBIUM—*Fasciculata*. A dwarf-tufted plant. Stems terete, about as thick as an ordinary writing pencil, 2—3 inches long. Leaves linear-lanceolate, acute, $1\frac{1}{2}$ — $2\frac{1}{2}$ inches long. Flowers in fascicles of twos and threes, but sometimes solitary, $2\frac{1}{2}$ inches across when spread out, of a uniform bright cinnabar-red, the lip veined with purple; sepals

* Reichenbach's name with description of the plant appeared August 1st, 1862; Lindley's was published 24 hours later; Lindley's *nodatum* must therefore sink as a synonym of Reichenbach's *Aphrodite*.

and petals similar and sub-equal, linear, acute; lip shorter than the other segments, sub-pandurate, convolute over the column at the base. Column very short.

Dendrobium arachnites, Rchb. in *Gard. Chron.* II. (1874), p. 354.

A remarkably beautiful and interesting Dendrobie of dwarf, dense habit, and producing brilliant red flowers, discovered in 1873—74 by Boxall, while collecting orchids in Moulmein for Messrs. Low and Co. But few plants appear to have reached England alive; the only one that we know of is in the collection of Mr. Lee, at Downside, by whose kindness we are enabled to give the above description.

D. *aureum*.

EUDENDROBIUM — *Fasciculata*. Stems erect, stoutish, sub-cylindric, attenuated below, 9—18 inches high, amber-yellow when divested of the sheathing base of the leaves. Leaves oblong-lanceolate, acute, 4—5 inches long, deciduous. Flowers with a pleasant primrose fragrance, 2—2½ inches across, on short pedicels, produced in twos and threes from the upper nodes of two and three years old stems; sepals and petals spreading, cream colour, the former oblong-lanceolate, acute, the latter broader, ovate-oblong, with a raised mid-line; lip with a broad convolute claw and deltoid blade, much reflexed, buff-yellow streaked with reddish purple, disc velvety; spur funnel-shaped, obtuse. Column orange-red on the side opposite lip.

Dendrobium aureum, Lindl. Gen. et Sp. Orch. p. 77 (1831). Wight Ic. pl. Ind. or. t. 1646 (1852). Thwaites' Pl. zeyl. p. 297. *D. heterocarpum*, Wallich, *fide* Lindl. Gen. et Sp. Orch. p. 78 (1831). *Bot. Mag.* t. 4708 (1853). Van Houtte's *Pl. des Serres*, VII. t. 842.

var.—*Henshalli*.

Stems longer and more slender than in the typical form; lip white, the base only suffused with yellow, where there are two reddish purple spots.

D. aureum Henshalli, supra. *D. heterocarpum Henshalli*, *Bot. Mag.* t. 4970.

var.—*pallidum*.

Stems longer and more slender than in the typical form. Flowers sometimes smaller, with the lip white, except at the base, where there is a yellow stain.

D. aureum pallidum, Lindl. in *Bot. Reg.* 1839, t. 20.

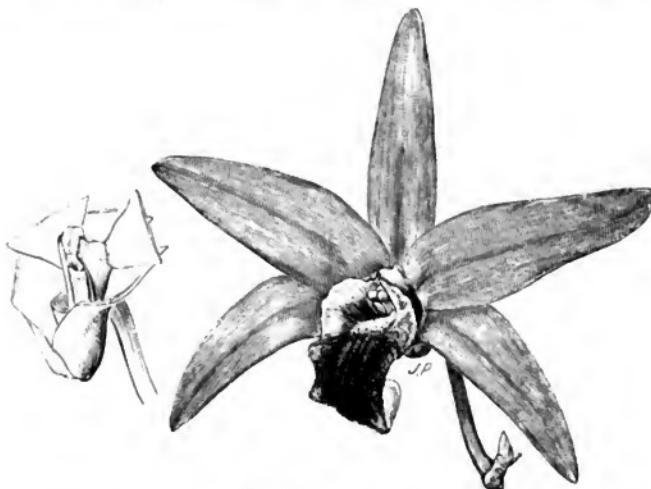
var.—*philippinense*.

Stems decumbent, three feet or more long, rarely short and erect. Flowers pale yellow, larger than in the typical *Dendrobium aureum*, with the sepals and lip more acute, the latter of which has an orange-yellow disc striped with red-purple.

D. aureum philippinense, Rchb. in *Gard. Chron.* XIII. (1880) p. 72. *D. rhombeum*, Lindl. in *Bot. Reg.* 1843, t. 17.

sub.-vars. distinguished by colour only ; *album*, flowers very pale, nearly white ;* *aurantiacum*, flowers orange-yellow, the richest coloured of all the forms yet introduced.

Dendrobium aureum is one of the most widely distributed of all Dendrobes ; it has been gathered in eastern Assam, on the Khasia Hills, in Nepaul, the Madras presidency, on the elevated parts of the southern province of Ceylon, in Moulmein and other parts of Burmah, and in the Philippine Islands ; it is, therefore, not surprising that it should prove to be a polymorphous species. It was first sent to England from the Khasia Hills, by Gibson, in 1837 ; it was collected by Simons, in Assam, in 1852 ; the variety



Dendrobium aureum.

Henshalli was said to have been received by Messrs. Rollisson, from Java, in 1857 ;† *pallidum* was found in Ceylon by Mr. Macrae, growing on trees near Nuera Ellia ; *philippinense* was sent by Cuming, in 1842, to Messrs. Loddiges, from the Philippine Islands ; it occurs in various parts of the island of Luzon, chiefly on trees, and not infrequently on the stems of the Cocoa-nut Palm. Both the typical *D. aureum* and its varieties flower in January and February, when few other Dendrobes are in bloom, the pleasant fragrance of the blossoms lending an additional charm to their

* The distinction between the varieties *pallidum* and *Henshalli*, and between these and the sub-variety *album* is by no means clear.

† The presence of *Dendrobium aureum* in Java seems to require confirmation.

pleasing colours. *D. aureum* has proved to be one of the most potent of Dendrobes for hybridising, and has participated in the parentage of most of the finest hybrids yet raised. The applicability of the names *aureum*, "golden," and *heterocarpum*, "various-fruited," to this species is by no means clear.*

D. barbatulum.

EUDENDROBIUM—*Culostachys*. Stems 9—15 inches long, curved, swollen at the base, tapering at the apex. Leaves narrowly lanceolate, 3—4 inches long, deciduous. Flowers 1½ inches in diameter, crowded in a lateral or pseudo-terminal raceme, pure white; sepals lanceolate; petals ovate-acute, sometimes as broad again as the sepals, but sometimes nearly equal to them; lip with two small ascending acute lateral lobes, and a spreading obovate intermediate one, and with a small tuft of greenish yellow hairs at the base; spur conical, greenish.

Dendrobium barbatulum, Lindl. Gen. et Sp. Orch. 84 (1831). *Bot. Mag.* t. 5918.
D. Heyneanum, Hort. not Lindl.

Discovered in the early part of the present century in the forests that cover the mountains in western and southern Hindostan, usually growing on bushes and small trees exposed to the sun during the dry season.† It has occasionally been confounded with other white-flowered Dendrobes, especially with *Dendrobium Fytchanum*, figured in the *Botanical Magazine*, t. 5444, as *D. barbatulum*, but which is a Moulmein species with orbicular petals and a totally different lip; also with *D. Heyneanum*, a still nearer ally but a much smaller plant, with slender stems not more than 2—4 inches high, bearing linear leaves and few-flowered racemes of small flowers.

D. Bensoniae.

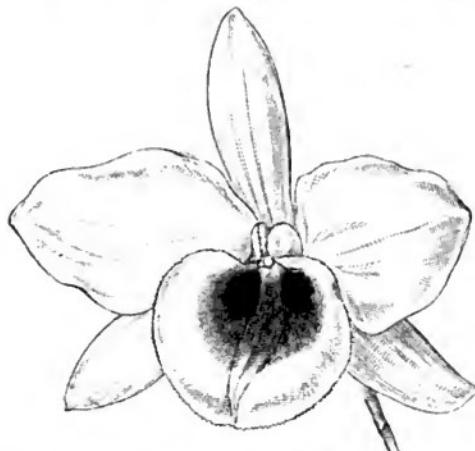
EUDENDROBIUM—*Fasciculata*. Stems cylindric, erect, 12—30 inches high, the larger ones as thick as the little finger. Leaves linear, 2—3 inches long, deciduous. Flowers 2½ inches in diameter, in fascicles of twos and threes, but sometimes solitary from the uppermost joints, milk-white, with an orange-yellow disc on the lip, at the base of which are two maroon spots that are sometimes confluent; sepals oblong; petals much broader, elliptic-oblong; lip orbicular, concave and downy above, with a short convolute claw and minutely toothed margin.

Dendrobium Bensoniae, Rchb. in Bot. Zeit. 1867, p. 230, *fide* Hemsley. *Bot. Mag.* t. 5679 (1867). *Fl. Mag.* t. 355. Jennings' *Orch.* t. 32.

* Many plants of *Dendrobium aureum* have fruited in our houses during the last few years, but we have never observed any variability in the capsules, except in size; a circumstance attributable to the condition of the stems that bore them.

† Major-General E. S. Berkeley, M.S., to whom our best acknowledgments are due for this and other notes on Dendrobiums observed *in situ*.

Sent to us in 1866 from British Burmah by Colonel Benson, after whose wife it is named at his own request. It occurs on the mountains near Tongou, direct west of Prome, at an elevation of about 1,500 feet above sea level,* and spreads southwards as far as the



Dendrobium Bensoniae.

latitude of Moulmein. Ever since its introduction it has been regarded as one of the finest of the white-flowered Dendrobes in the section to which it belongs. The spots on the lip are variable, being sometimes large and even confluent, sometimes not larger than small peas, and in one sub-variety called *xanthinum* they are altogether absent. *Dendrobium Bensoniae* usually flowers in May and June, and occasionally later. As regards its vegetation, two forms are known in gardens, the original from the Arracan Hills, and the other, with more robust stems, from the Karen Hills.†

D. *bigibbum*.

STACHYOBIA—*Speciosa*. Stems cylindric or sub-fusiform, 12—18 inches high, as thick as an ordinary writing-pencil, and furnished at their upper part with 4—8 oblong-lanceolate leaves 3—5 inches long, persistent about two years. Peduncles pseudo-terminal, slender, a foot or more long, racemose along the distal half, many-flowered. Flowers 1½—2 inches in diameter, magenta-purple, the lip of a deeper shade; sepals oblong-acute; petals sub-orbicular, much larger than the sepals; lip three-lobed, the lateral lobes large, oblong, incurved, the intermediate

* Colonel Benson, in Gard. Chron. 1870, p. 796.

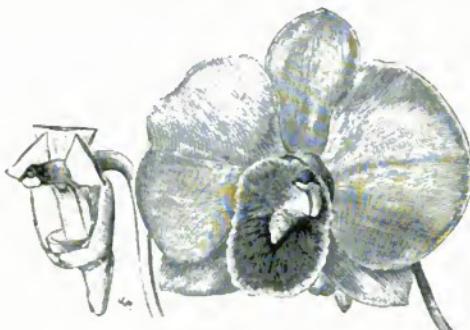
+ Major-General E. S. Berkeley, in Gard. Chron. III. s. 3 (1880), p. 203.

one oblong, retuse, reflexed, and with a white elevated, papillose crest. Column compressed, grooved in front.

Dendrobium bigibbum, Lindl. in Paxt. Fl. Gard. III. p. 25 (1852). *Bot. Mag.* t. 4898 (1856). Van Houtte's *Fl. des Serres*, t. 1143 (copied from the *Bot. Mag.*). Warner's *Sel. Orch. II.* t. 8. Benth. Fl. Austral. VI. p. 277. Williams' *Orch. Alb.* I. t. 38.

sub-vars.—*candidum*, flowers white with a purple blotch on each side of the crest of the lip; *superbum* (*Gard. Chron.* X. (1878), p. 748; *Fl. Mag.* n. s t. 229), flowers larger and more brightly coloured than the ordinary form.

One of the most showy of the Australian Dendrobes, and one of the longest known, it having been in cultivation in the Royal Gardens at Kew in 1824,* but it appears to have been lost afterwards. It was re-discovered by Dr. Thomson, in 1855, on Mount Adolphus, near



Dendrobium bigibbum.

Torres Straits, and sent by him to Messrs. Loddiges, at Hackney; ten years later it was detected in the same locality by the late Mr. J. Gould Veitch, who sent to England the first large importation ever received. The sub-varieties are from the same region; *superbum* was discovered by Mr. J. G. Veitch in 1865, and *candidum* was introduced by Mr. B. S. Williams, of Holloway. The usual time of flowering of *Dendrobium bigibbum* is September and October, and occasionally later. Its specific name refers to the double gibbosity at the base of the lip just above the spur.

D. *binoculare*

EUDENDROBIUM—*Calostachys*. Stems slender and rod-like, of variable length. Leaves lanceolate, acute, 3—4 inches long. Racemes ascending, 5—9 flowered. Flowers reddish or coppery orange, except at the apex

* *Fide* Rehb. in *Gard. Chron.* X. (1878), p. 748.

of the lip, where it is yellow and with two maroon spots near the base; sepals and petals oblong, sub-acute, the petals a little the broadest; lip sub-rhomboïd, with denticulate margin, and clothed above with a short close-set pubescence.

Dendrobium binoculare, Rehb. in *Gard. Chron.* 1862, p. 785.*

Sent to us from British Burmah, in 1868, by Colonel Benson, who found it growing in shady places on hills eastward of Prome. Its nearest ally is *Dendrobium fuscatum*, from which it is said to be distinguished by its more slender stems, smaller leaves and flowers, with differently shaped lip. It is now but rarely seen in British collections. The name *binoculare* (non-classical), refers to the two spots or "eyes" on the labellum.

D. Boxalli.

EUDENDROBIUM—*Fasciculata*. Stems slender, pendulous, 30—40 inches long, swollen at the joints. Leaves linear-lanceolate, acute, 3—4 inches long, deciduous. Flowers 2½ inches in diameter, on short purplish pedicels, usually in pairs, but sometimes solitary; sepals and petals similar and sub-equal, linear-lanceolate, white, margined and tipped with pale mauve-purple; lip sub-orbicular, rolled up at the base, tawny yellow bordered with white and with a mauve-purple blotch at the anterior margin.

Dendrobium Boxalli, Rehb. in *Gard. Chron.* I. (1874) p. 315. Id. *Xen. Orch. II.* p. 212, t. 194. *Fl. Mag.* 1874, t. 114. Jennings' *Orch.* t. 19.

Discovered by Boxall in the rich Dendrobie region of Lower Burmah, and sent by him to Messrs. Low and Co., of Clapton, in 1873. Its nearest allies are *Dendrobium crystallinum* and *D. crassinode*, from both of which it may be easily distinguished by its stems as well as by some structural differences in the flowers; from *D. crystallinum* by its swollen nodes, and from *D. crassinode* by its more slender and longer stems, with less prominent nodes, and by its paler flowers. It usually flowers in February and March.

D. Brymerianum.

EUDENDROBIUM—*Calostachys*. Stems stoutish, terete, 12—24 inches long, slightly swollen in the middle, tapering at both ends. Leaves lanceolate, acuminate, 4—5 inches long, persistent. Flowers 3 inches in diameter, solitary or in few-flowered racemes from the uppermost joints, golden yellow; sepals and petals sub-equal, ovate-oblong; lip triangular-cordate in outline, with a long flexuose, branched fimbriation; disc papillose.

Dendrobium Brymerianum, Rehb. in *Gard. Chron.* IV. (1875), p. 323. *Bot. Mag.* t. 6383. *Fl. Mag.* n.s. t. 459.

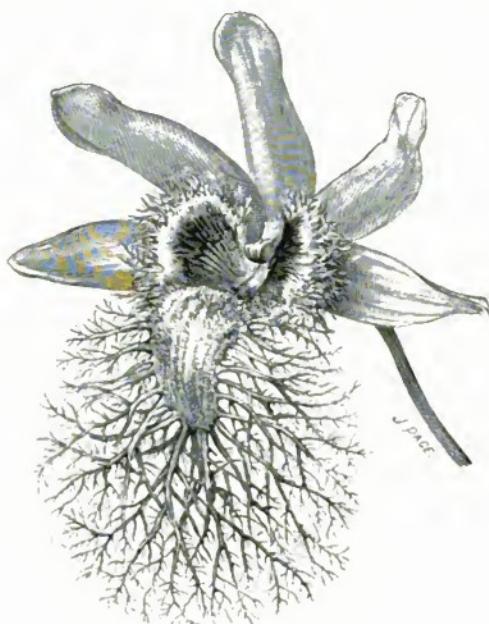
* See note under *Dendrobium Gibsonii infra*.

var.—*histrionicum*.

Stems shorter and more swollen in the middle; flowers smaller, of a duller colour, and with the fringe of the lip rarely developed, and if so, shorter than in the original type.

D. Brymerianum histrionicum, Rehb. in Gard. Chron. III. s. 3 (1888), p. 104.

A remarkable species, introduced by Messrs. Low and Co., from Burmah, in 1874. The extraordinary papillose fringe of the lip, which exceeds in length that of every other allied species, is its



Dendrobium Brymerianum.

most striking characteristic. It is dedicated to Mr. W. E. Brymer, in whose collection at Ilsington House, near Dorchester, it flowered for the first time in this country shortly after its introduction. It usually flowers in February and March. The variety is a more recent importation from Upper Burmah; it is greatly inferior to the original type, and has proved most disappointing to amateurs; its flowers, which appear in the autumn, are self-fertilising before they expand, and are rarely properly developed.

D. canaliculatum.

STACHYOBIUM—*Elatiores*. Stems pseudo-bulbous, pear-shaped, 2—3 inches long, bearing at the apex 3—5 fleshy linear-acute, almost semi-cylindric leaves, twice as long as the stems. Peduncles rigid, erect, 12—15 inches high, terminating in a loose raceme of 12—20 flowers. Sepals and petals similar and sub-equal, linear-oblong, white at the base, the remainder yellow; lip oblong, three-lobed, the lateral lobes angular; anterior lobe sub-orbicular, broader than long, apiculate, white with mauve-purple disc, the basal part traversed longitudinally by three raised undulate lines which terminate in three rhomboidal plates.

Dendrobium canaliculatum, R. Br. Fl. Nor. Holl. p. 338 (1810). Rehb. Xen. Orch. II. p. 165. Fitzgerald's Austral. Orch. I. part 4. Benth. Fl. Austral. VI. p. 232. D. Tattonianum, Batem. Bot. Mag. t. 5537.

Discovered by Banks and Solander in the beginning of the present century, but not introduced till 1865, in which year it was rediscovered by the late Mr. J. Gould Veitch, at Endeavour Creek, York Peninsula, in North-east Australia; it has also been reported from Rockingham Bay. Its most noticeable peculiarities are its pseudo-bulbous stems, and its deep-coloured lip, in strong contrast to the pale colours of the other segments; its flowers are among the most fragrant in the genus.

D. capillipes

EUDENDROBIUM—*Fasciculata*. A dwarf tufted plant. Stems fusiform, 2—3 inches long, yellowish and striated when old. Leaves one or two on each stem, lanceolate, acute. Flowers solitary or in pairs on thread-like peduncles 3 inches long, golden yellow with a deeper blotch on the lip; sepals lanceolate, acute, small, the lateral two concealed by the broad oval petals; lip with a convolute claw and reniform blade, which has a shallow sinus in the anterior margin.

Dendrobium capillipes, Rehb. in Gard. Chron. 1867, p. 997. Id. Xen. Orch. II. p. 164.

A dwarf tufted species discovered by the Rev. C. Parish, in the Moulmein district of British Burmah, and introduced by Messrs. Low and Co. in 1866; its habitat is on the hills north of Thayetmyo, and again still further north, growing chiefly on deciduous trees. It should be grown on a block of wood suspended near the roof glass, it then flowers freely in March and April. The specific name, from *capilla*, "hair," and *pes*, "a foot," refers to the hair-like foot-stalks of the flowers.

D. cariniferum.

EUDENDROBIUM—Formosæ. A robust plant. Stems sub-cylindric, 6—9 inches long. Leaves narrowly oblong, 4—5 inches long, sessile, unequally lobed at apex, deciduous. Flowers $1\frac{1}{2}$ inches across, solitary or in twos and threes near the apex of the stems; sepals lanceolate, acute, prominently keeled behind, pale fawn-yellow, fading to ivory-white; petals broader, ovate, white; lip three-lobed, produced at the base into a long obtuse spur, the side lobes triangular, turned inwards, reddish orange; the middle lobe sub-quadrata, spreading, undulate, with tufts of long woolly hairs along the veins on the upper surface, reddish orange at the base, anterior part white, sometimes pale orange. Column triquetral, white above, orange-red below.

Dendrobium cariniferum, Rchb. in Gard. Chron. 1869, p. 611.

var.—Wattii.

Leaves narrower, with nearly smooth sheaths. Flowers larger, white, with parts of the lip yellow, the middle lobe of which is longer than in the type, and two lobed.

D. cariniferum Wattii, Bot. Mag. t. 6715.

A native of British Burmah, of whose first introduction we find no record. It flowered for the first time in this country in the collection of Mr. Marshall, at Enfield, in 1869. Major-General E. S. Berkeley informs us that it occurs on the hills at a considerable elevation, and under much the same conditions of temperature, etc., as *Dendrobium Infundibulum*. The variety *Wattii* is of more recent introduction, and is named after its discoverer, Dr. Watt, who met with it "whilst attached to the mission engaged in the boundary survey of the kingdom of Munipore on the eastern frontier of British India." *D. cariniferum* usually flowers in April. The specific name, "keel-bearing," refers to the prominently keeled sepals.

D. chlorops.

STACHYOBIA—Speciose. Stems tufted, slender, 12—18 inches long. Leaves not seen. Racemes lateral or pseudo-terminal, nodding, 4—6 inches long, many-flowered. Flowers fragrant when first expanded, $\frac{3}{4}$ inch in diameter; sepals and petals cream-white, the former oblong-lanceolate, the latter oval; lip three-lobed, the side lobes sub-quadrata, erect, greenish; the middle lobe oblong, cream-white, with a pubescent disc; spur conic, short. Column greenish, anther white.

Dendrobium chlorops, Lindl. in Bot. Reg. 1844, misc. 54.

Introduced by Messrs. Loddiges from Southern India about the year 1843, and occasionally imported since with other Dendrobiums from the same region, where it is very abundant. The specific name,

from $\chi\lambda\omega\rho\circ\zeta$ (chloros), "green," and $\circ\psi$ (ops), "the eye," refers to the greenish centre of the flower. The flowers usually appear in the orchid houses of Europe in January and February.

D. chrysanthum.

EUDENDROBIUM—*Fasciculata*. Stems slender, 5—7 feet long, slightly flexuous, leafy throughout. Leaves lanceolate, acuminate, 4—6 inches long, $\frac{3}{4}$ —1½ inches wide at the broadest part, deciduous. Flowers in racemes of 4—6, produced from the current year's growth, while the leaves are still fresh, of firm wax-like texture, bright orange-yellow with two maroon spots on the lip; sepals oval-oblong; petals broadly obovate; lip orbicular with fimbriate margin, rolled over the column at the base. Column very short.

Dendrobium chrysanthum, Lindl. in *Bot. Reg.* t. 1299 (1829). Regel's *Gartenfl.* t. 446 (1864). D. Paxtonii, Lindl. *Bot. Reg.* 1839, misc. No. 56, not Paxt. *Mag. Bot.* VI. p. 169.

Native of the hot valleys of the lower Himalayan zone, whence it was introduced into the Botanic Garden at Calcutta by Dr. Wallich, who brought it to England in 1828; it is also widely distributed throughout Upper Burmah, varying somewhat in the size and brilliant colouring of its flowers. It flowered for the first time in this country in the Horticultural Society's Garden at Chiswick, in 1829. The specific name is literally golden-flower, from $\chi\rho\upsilon\sigma\tau\circ\zeta$, "golden," and $\circ\psi\theta\circ\zeta$, "a flower."

Dendrobium chrysanthum is one of the handsomest of the late-flowering Dendrobes. The grand specimen at Burford Lodge, probably the finest in Europe, is grown in a teak basket, suspended close to the glass near the ridge of the East Indian House. In September, 1884, the flowering stems, upwards of fifty in number, were loaded with golden blossoms, and presented one of the most gorgeous orchid displays imaginable. The plant begins to grow immediately after it has flowered; more root room is then given if it needs it, and as it continues to grow through the winter months the temperature of the house is never allowed to fall below 15° C. (60° F.), and the compost in which it is growing is at no time allowed to get dry.

D. chryseum.

EUDENDROBIUM—*Calostachya*. Stems much tufted, terete, somewhat slender, erect, 12—24 inches high. Leaves from the uppermost joints only, linear-lanceolate, acuminate or emarginate, 3—4 inches long. Flowers from the leafless stems, sometimes solitary, but more commonly in racemes of twos and threes, of a rich golden yellow, almost orange, with a few faint crimson lines on the side lobes of the lip;

sepals oblong; petals broadly elliptical, almost as broad again as the sepals; lip orbicular, pubescent, with minutely fimbriated margin, obscurely three-lobed, the small side lobes rolled over the very short column; spur short, obtuse.

Dendrobium chryseum, Rolfe in Gard. Chron. III. s. 3 (1888), p. 233.

A species with deep yellow flowers, said to be of Assamese origin, recently introduced by Mr. Horsman, nurseryman of Colchester, from whom we acquired the stock. It is distinct from any Dendrobie hitherto in cultivation, although evidently near *Dendrobium fimbriatum*, but the horticultural merits of the species cannot be fairly estimated till the plants shall have been longer established in their new homes.

D. Chrysocrepis.

EUDENDROBIUM—*Fasciculata*. Stems slender, 6—10 inches long, dilated above into a flattened leafy pseudo-bulb, bearing three or more elliptic lanceolate, pointed leaves 2—3 inches long. Flowers golden yellow, with deeper lip, $1\frac{1}{2}$ inches in diameter, produced singly from the old leafless stems on short slender peduncles; dorsal sepals and petals similar, obovate, concave; lateral sepals ovate, more spreading; lip somewhat pear-shaped, ventricose, velvety, the inner surface densely clothed with reddish hairs.

Dendrobium Chrysocrepis, Parish and Rchb. *fide Bot. Mag. t. 6007* (1872).
Trans. Linn. Soc. XXX. p. 150.

"A curious species discovered by the Rev. C. Parish, in Moulmein, and communicated by him to the Royal Gardens at Kew, in 1871, where it flowered in March of the following year."* The specific name, from $\chi\rho\sigma\tauος$ (*chryseos*), "golden" and $\kappaρηπικ$ (*crepis*), "a slipper," refers to the labellum, the singular structure of which is not less deserving the attention of the amateur than of the botanist.

D. chrysotoxum.

EUDENDROBIUM—*Calostachys*. Stems variable in form and size, usually clavate, but sometimes spindle-shaped and ribbed, 3—4 inches long, with 3—4 leaves, sometimes sub-cylindric, furrowed, 12—15 inches long, and more than an inch thick, with 5—8 leaves. Leaves varying from linear-to ovate-oblong, acute, 4—5 inches long, leathery, deep green. Racemes lateral from near the top of the stems, 6—9 inches long, drooping, many-flowered. Flowers 2 inches in diameter, with spreading segments, of a rich golden-yellow with an orange-yellow disc on the lip, on which are a few reddish streaks near the base; sepals elliptic-oblong; petals

* *Bot. Mag. sub. t. 6007.*

obovate-oblong, as broad again as the sepals; lip orbicular, with a convolute claw beneath which is a blunt spur, upper surface pubescent, margin fimbriate.

Dendrobium chrysotoxum, Lindl. in *Bot. Reg.* 1847, t. 36. *Bot. Mag.* t. 5053. *Illus. hort.* 1858, t. 164.

var.—suavissimum.

Stems frequently but not always shorter and stouter, and the leaves broader and shorter than in the type; the lip with a large striated maroon blotch.

D. chrysotoxum suavissimum, supra. *D. suavissimum*, Rehb. in *Gard. Chron.* I. (1874), p. 406. *Id. Xen. Orch.* III. p. 2, t. 202. *The Garden*, XIII. (1878), t. 116.

Dendrobium chrysotorum is widely distributed over the plains and mountains of Lower Burmah. On the Arracan Mountains, 150 miles west of Prome, and also on the mountains of Moulmein, it ascends to 2,500—3,000 feet above sea-level; at its highest elevation the stems are compressed, and almost globose;* in the plains, especially in partial shade, they are elongated as described above. It was imported, in 1847, by Messrs. Henderson; it flowers in March and April. The variety was introduced by Messrs. Low and Co. from Upper Burmah, in 1874, through their collector Boxall; it usually flowers in June. The specific name, literally "The Golden Arch" (from χρύσεος, "golden," and τόξον, "a bow"), is somewhat fanciful, and was evidently suggested by the arching racemes of yellow flowers.

D. ciliatum.

STACHYOBIA — *Speciosa*. Stems tufted, as thick as an ordinary writing-pencil, 12–18 or more inches long. Leaves sessile, oval-oblong, gradually narrowing upwards, 3 inches long, deciduous. Racemes from the young growths pseudo-terminal and lateral, as long as the stems, many-flowered. Flowers 1 inch across; sepals and petals pale yellow, the former linear-oblong, the lateral two falcate; the petals linear, dilated at apex, longer than the dorsal sepal, with which they are nearly parallel; lip obscurely lobed, triangular, incurved at the sides, deep yellow, streaked obliquely with red-brown from either side of the trilamellate disc; anterior lobe small, triangular, fringed with yellow, clavate cilia. Column triquetral, bent.

Dendrobium ciliatum, Parish, *fide Bot. Mag.* t. 5430.

Sent from Moulmein to Messrs. Low and Co., in 1863, by the Rev. C. Parish. The flowers are peculiar both in form and colour, and appear in October and November. The specific name *ciliatum* (non-classical), from *cilium*, the eye-lash, refers to the fringed anterior

* Colonel Benson, in *Gard. Chron.* 1870, p. 796.

lobe of the lip. Two forms are known, both with flowers exactly alike, but extremely different in growth, the typical *Dendrobium ciliatum* having stems 18 inches long, the other, called *breve*, having short sharp-pointed stems but a few inches high.

D. *clavatum*.

STACHYOBIA — *Speciosæ*. Stems tufted, cylindric, as thick as the little finger, 20—30 inches long. Leaves ovate-lanceolate, $3\frac{1}{2}$ — $4\frac{1}{2}$ inches long. Racemes lateral from near the apex of the stems, few flowered. Flowers 2— $2\frac{1}{2}$ inches in diameter, orange-yellow, except the lip, which is bright yellow with a transverse maroon blotch; sepals oval-oblong; petals oval, as broad again as the sepals; lip with a convolute claw and orbicular blade, pubescent on the upper surface, and denticulate at the margin.

Dendrobium clavatum, Lindl. in Paxt. Fl. Gard. II. p. 108, t. 189.

First discovered by Dr. Wallich in Eastern Nepaul about the year 1827—28; it was introduced from the neighbouring province of Assam, in 1851, by Mr. Thomas Denne, of Hythe, in Kent. As distinguished from its near ally *Dendrobium fimbriatum oculatum*, the flowers are smaller, more fleshy, glossy on the surface; the lip is dentate, not fringed. It usually flowers in June. The specific name *claratum*, "shaped like a club," refers to the form of the stems.

D. *crassinode*.

EUDENDROBIA — *Fasciculata*. Stems sub-pendulous, curved, 12—24 inches long, "formed throughout of swollen internodes in the form of depressed spheres an inch in diameter and less than that apart." Leaves



Dendrobium crassinode.

linear-lanceolate, 4—5 inches long, deciduous. Flowers 2— $2\frac{1}{2}$ inches in diameter, solitary or in twos and threes from the upper nodes; sepals and petals similar, oblong, acute, white heavily tipped with mauve-

purple, the petals somewhat broader than the sepals; lip clawed, ovate-oblong, pubescent on the upper surface and minutely ciliated at the margin, with a large yellow disc surrounded with white and with a mauve-purple blotch at the apex.

Dendrobium crassinode, Rchb. in *Gard. Chron.* 1869, p. 164. *Bot. Mag.* t. 5766. Williams' *Orch. Alb.* IV. t. 152.

hybrid-crassino*di*-Wardianum.

Vegetative and floral organs well-nigh intermediate between the two supposed parents; nodes of stem less developed than in *Dendrobium crassinode*, with the internodes a little longer and less stout; the labelum less acute than in *D. Wardianum*, and with the maroon blotches much smaller.

*D. crassino*di*-Wardianum*, supra. *D. melanophthalmum*, Rchb. in *Gard. Chron.* XXV. (1866), p. 426.

sub-vars. — *albiflorum* (*Gard. Chron.* IV. (1875), p. 683), flowers white, except the orange-yellow disc on the lip; *Barberianum* (*Gard. Chron.* III. (1875), p. 683), flowers of brighter colours than in the typical *Dendrobium crassinode*, the mauve-purple spots at the tips of the segments are also larger and of a deeper colour.

Dendrobium crassinode was gathered by Colonel Benson, in 1868, on the mountains of Arracan, 150 miles east from Moulmein, at 2,500 feet elevation, and sent by him to the Royal Gardens at Kew and to our Chelsea Nursery, in both of which establishments it flowered simultaneously in January of the following year. It had, however, been made known to science ten years earlier, by the Rev. C. Parish, who sent a sketch of it to Sir W. J. Hooker, at Kew, from materials procured in the Siamese province of Kiong-koung.* The hybrid flowered in our houses in the spring of 1886, and is interesting as being the first, and probably the only supposed natural hybrid Dendrobie that has yet appeared; this very interesting plant is now in the collection of Baron Schroeder, at The Dell, near Staines. The sub-varieties *albiflorum* and *Barberianum* were introduced from Burmah by Messrs Low and Co., of Clapton, and subsequently by ourselves from localities remote from that in which Colonel Benson's plants were obtained, whence it is certain that *D. crassinode* has a considerable range in the eastern peninsula of India. The flowering season of *D. crassinode* is from January to March. The specific name refers to the swollen joints.

* *Bot. Mag.* sub. t. 5766.

D. *crepidatum*.

EUDENDROBIUM—*Fasciculata*. Stems almost as thick as the little finger, 12—18 inches long, jointed at intervals of about an inch, the internodes marked with longitudinal white lines on a sea-green ground. Leaves linear-lanceolate, 2—3 inches long, deciduous. Flowers on pale purple pedicels, in fascicles of twos and threes, produced from every joint except the lowermost, 1½ inches across, of wax-like texture, white tinted with lilac, except the disc of the lip, which is deep yellow; sepals and petals oval; lip with a short claw, and nearly cordate retuse blade, "which is plaited on each side at the base, forming a slipper-like cavity."

Dendrobium crepidatum, Lindl. in Paxt. Fl. Gard. I. p. 63 (1850-51). *Bot. Mag.* t. 4993 (1857). Id. t. 5011, var. *labello glabro*.

A native of Assam, introduced in 1849. It flowered for the first time in this country in the spring of the following year, in the gardens of R. S. Holford, Esq., at Westonbirt, near Tetbury, Gloucestershire. It is a most floriferous species, and when in full bloom, usually in February and March, forms a charming object. The specific name, *crepidatum*, "wearing slippers," refers to the slipper-like hollow near the base of the lip.

D. *cretaceum*.

EUDENDROBIUM—*Fasciculata*. Stems stoutish, 9—12 or more inches long, curved. Leaves oblong-lanceolate, 2—3 inches long, deciduous. Flowers 1½ inches in diameter, solitary, on short pedicels ¼ inch long, cream-white with the disc of lip yellowish streaked with crimson; sepals and petals nearly equal, lanceolate, spreading; lip oval-oblong, convolute over the column at the base, blade undulate, minutely fringed at the margin.

Dendrobium cretaceum, Lindl. in *Bot. Reg.* 1847, t. 62. *Bot. Mag.* 4686. Van Houtte's *Pl. des Serres*, t. 818 (copied from *Bot. Mag.*).

Discovered by Griffith, on the Khasia Hills, in the early part of the present century, but not introduced till 1846, in which year it was sent from Moulmein, by Thomas Lobb, to the Exeter Nursery. It is widely distributed over the eastern peninsula of India, from Assam to Tenasserim, and also over the Indian Archipelago. The specific name, from *creta*, "chalk," refers to the colour of the flowers, which appear in May and June.

D. *cruentum*.

EUDENDROBIUM—*Formosae*. Stems erect, terete, about a foot long, swollen at the base. Leaves elliptic-oblong, obliquely emarginate, deciduous. Flowers solitary or in pairs, 1½—2 inches in diameter;

sepals triangular-ovate, acuminate, keeled at the back, pale green with deeper longitudinal veins; petals linear, acute, coloured like the sepals; lip three-lobed, the lateral lobes oblong, erect, crimson-scarlet; intermediate lobe ovate, apiculate, pale green bordered with red, and with a large tumid warty red crest, below which are five raised red lines, of which the outside two are the most developed. Column tridentate at the apex, green with crimson margins.

Dendrobium cruentum, Rehb. in Gard. Chron. XXI. (1884), p. 604. Williams' *Orch. Alb.* IV. t. 174.

Introduced by Sander and Co., in 1884, from the "west coast of the Malayan peninsula."* The specific name, *cruentum*, "blood-red," refers to the colour of the lip. As a species it is distinct, and the colour of its flowers remarkable.

D. *crystallinum*.

EUDENDROBIUM—*Fasciulata*. Stems tufted, sub-pendulous, 12—18 or more inches long. Leaves linear-lanceolate, acute, 4—6 inches long, deciduous. Flowers about 2 inches across, solitary or in twos and threes, on slender peduncles sheathed by membranous bracts to nearly half their length; sepals linear-oblong, undulate, white, sometimes with a pale amethyst-purple blotch near the apex, but which is always present on the petals; petals much broader, obovate-oblong; lip sub-orbicular with a convolute claw, deep ochreous yellow bordered with white, and generally with an amethyst-purple stain at the anterior margin.

Dendrobium crystallinum, Rehb. in Gard. Chron. 1868, p. 572. Id. *Xen. Orch. II.* p. 210, t. 193. *Bot. Mag.* t. 6319.

A native of the Arracan Mountains, near Tongu, in British Burmah, where it was discovered by Colonel Benson, in 1867, "growing upon small trees in exposed places," often in company with *Dendrobium Bensoniae*, and introduced by us through him. It flowered for the first time in Europe in our Chelsea Nursery, in the spring of the following year. As a species, it is chiefly distinguished from all its congeners of the EUDENDROBIUM section by its elongated anther case, covered with numerous crystalline *papille*, which suggested the specific name.

D. *cumulatum*.

EUDENDROBIUM—*Pycnostachys*. Stems tufted, slender, pendulous, 18—24 inches long. Leaves oblong, acuminate, 3—4 inches long. Flowers 1 inch in diameter, rosy purple suffused with white, collected into sub-globose corymbs, the rachis of which, as well as the pedicels, are deep

* The west coast of the Malay peninsula extends for upwards of a thousand miles from Martaban to Singapore; the habitat of this Dendrobium is thence virtually withheld.

reddish purple; sepals and petals sub-equal, oblong; lip obovate-oblong, longer and broader than the petals, prolonged at the base into a slightly curved obtuse spur.

Dendrobium cumulatum, Lindl. in *Gard. Chron.* 1855, p. 756. Rehb. idem, 1868, p. 6. *Bot. Mag.* t. 5703.

This pretty Dendrobie first appeared in the collection of Mr. F. Coventry, at Shirley, near Southampton, in 1855, its native country being then unknown. Twelve years later it was sent to Kew, by Colonel Benson, from Moulmein, and also to our Chelsea Nursery, where, as well as at Kew, it flowered in the autumn of 1867. The specific name, *cumulatum*, "crowded," refers to the crowded corymbs of flowers.

D. *cymbidioides*.

STACHYOBIA—*Speciosa*. “Pseudo-bulbs ovate or oblong-ovate, angulate, bearing at the summit two oblong, obtuse coriaceous leaves longer than the pseudo-bulbs. Peduncles terminal, from between the leaves, erect, loosely racemose, 5—7 flowered. Flowers medium size, showy; sepals and petals uniform, linear-oblong, spreading, ochraceous yellow; lip much shorter, oblong-cordate, white with dark purple linear blotches near the base, three-lobed, bearing on the disc tubercles arranged in two or three lines or series; the side lobes short, incurved; the terminal lobe ovate-obtuse. Column short.”—*Botanical Magazine*.

Dendrobium cymbidioides, Lindl. Gen. et Sp. Orch. p. 77 (1831). *Bot. Mag.* t. 4755 (1853). *Desmotrichium cymbidioides*, Bl. Bijdr. p. 355.

A rare species, now seldom seen in gardens, discovered by the Dutch botanist, Blume, in the early part of the present century, on the wooded mountains of Salak, in Java; it was first introduced into British orchid collections by Messrs. Rollisson, of Tooting, about the year 1852.

D. *Dalhousieanum*.

STACHYOBIA—*Speciosa*. Stems terete, as thick as the little finger, 3—4 feet long, but sometimes much shorter, spotted with purple when young. Leaves ovate-lanceolate, 4—6 inches long, deciduous. Racemes produced from the uppermost joints, pendulous, 7—10 or more flowered. Flowers 4—5 inches across, pale nankeen-yellow veined and tinted with rose, and with a large maroon-purple blotch on each side of the lip near its base; sepals lanceolate, the two lateral ones falcate; petals ovate; lip oval, concave, obscurely three-lobed, fringed and hairy on the anterior side. Column whitish.

Dendrobium Dalhousieanum,* Paxt. *Mag. Bot.* XI. p. 145 (1844). *Bot. Reg.* 1846, t. 10. Van Houtte's *Fl. des Serres*, VII. t. 698 (1851). *Illus. hort.* 1864, t. 423. Warner's *Sel. Orch.* I. t. 22.

* Dr. Wallich was probably the author, or at least the suggester of the name.

Introduced to Chatsworth, in 1837, by Gibson, who obtained it from the Calcutta Botanic Garden. It had been presented to the Calcutta Garden by Lady Dalhousie without any intimation of its habitat; it is now known to be widely distributed throughout



Dendrobium Dalhousianum.

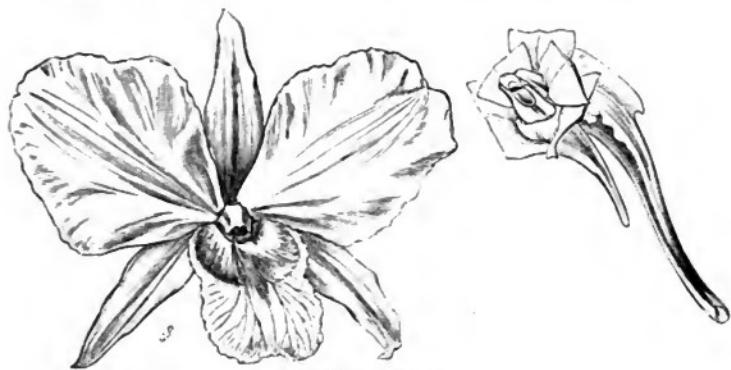
Burmah, whence it has been frequently imported. Ever since its introduction, *Dendrobium Dalhousianum* has been generally recognised as one of the noblest of the genus; its racemes are frequently—not always—produced from the leafless stems several years in succession; they usually appear in April and May, and last about a week.

D. Dearei.

STACHYOBIA—*Speciosa*. Stems robust, 24—36 inches long, the upper third clothed with sessile, oval-oblong, acute, sometimes emarginate leaves 2 inches long, that are persistent about two years. Peduncles from the uppermost joints, racemose, 5—7 or more flowered. Flowers white, $2\frac{1}{2}$ inches in diameter, on triquetral whitish pedicels; sepals lanceolate, acuminate with recurved tips; petals oval, nearly three times as broad as the sepals and slightly undulate; lip oblong, obtuse, obscurely three-

lobed, with a pale yellowish green transverse zone nearly mid-way between the base and the anterior margin; spur elongated, funnel-shaped. Column dilated at the base.

Dendrobium Dearei, Rchb. in *Gard. Chron.* XVIII. (1882), p. 361. Williams' *Orch. Alb.* III. t. 120.



Dendrobium Dearei.

This beautiful Dendrobie, a comparatively recent addition to the genus, was discovered by Colonel Deare, in 1882, on the island of Dinagat, one of the Philippine group. It is abundant on several of the small islets off the north-east coast of Mindanao, whence it has since been imported in considerable quantities. It flowers in July and August.

D. densiflorum.

EUDENDROBIUM—*Calostachys*. Stems clavate, four-angled, 12—18 inches high, bearing at and below their apex three, sometimes more, elliptic-oblong, acute, persistent leaves, 4—6 inches long. Racemes pendulous, 7—9 inches long, many-flowered. Flowers 2 inches across, on pedicels spirally and closely arranged round the rachis; sepals and petals of semi-transparent texture, orange-yellow; the sepals ovate-oblong, acute; the petals clawed, suborbicular with denticulate margin; lip downy, rich orange-yellow, with a convolute claw that gives the sub-orbicular, fimbriate blade the form of a wide-mouthed funnel.

Dendrobium densiflorum, Wallich. Lindl. Gen. et Sp. Orch. p. 99 (1831). *Bot. Reg.* t. 1828 (1835). *Bot. Mag.* t. 3418. Paxt. *Mag. Bot. V.* p. 121 (1838). Van Houtte's *Fl. des Serres*, t. 1397 (1861).

var.—*Schroederi*.

Stems angulate; racemes longer and looser, with larger flowers; sepals and petals French white, the deep orange of the lip shading off to pale yellow at the anterior margin.

D. densiflorum Schroederi, Hort. *Fl. Mag.* t. 502. *D. densiflorum album*, Hort.

Originally discovered by Wallich in the early part of the present century, growing on moss-covered trees in the hot, damp valleys of Nepaul, and introduced by him about the year 1828—29; it flowered for the first time in this country in Messrs. Loddiges' Nursery in 1830. It was collected on the Khasia Hills, in 1836, by Gibson, while on a mission to India for the Duke of Devonshire. It is sparingly spread over the lower Himalayan zone from Nepaul to Assam, where its vertical range is 2,500—3,500 feet. The variety *Schroederi* first appeared in the collection of Mr. J. W. Schroeder, at Stratford Green, Essex, and has ever since been recognised as one of the most beautiful of Dendrobiums. The flowering season of *Dendrobium densiflorum* is from March to May.

D. Devonianum.

EUDENDROBIUM—*Fasciulata*. Stems terete, pendulous, about a yard long. Leaves 3—4 inches long, linear-lanceolate, acute, deciduous. Flowers 2 inches across, on slender pedicels, produced singly or in pairs along the distal half of the stems; sepals lanceolate, white stained with pale amethyst-purple at their apex; petals ovate, acute, ciliate, as broad again as the sepals; lip broadly cordate, with a convolute claw and fringed at the margin, white with two orange-yellow blotches on the disc and a purple one at the apex. Column white.

Dendrobium Devonianum, Paxt. *Mag. Bot.* VII. p. 169 (1840). *Bot. Mag.* t. 4429. Van Houtte's *Fl. des Serres*, t. 647. *Belg. hort.* III. p. 204. *Illus. hort.* 1857, t. 145. Warner's *Sel. Orch.* II. t. 2.



Dendrobium Devonianum.

var.—*rhodoneurum*.

Floral segments shorter, the white portions of which are veined with rose-purple.

D. Devonianum rhodoneurum, Rehb. in *Gard. Chron.* 1868, p. 682.

sub-vars.—*candidulum* (Gard. Chron. V. (1876), p. 654), flowers white with the usual two orange-yellow blotches on the lip and purple spot on the spur; *Mr. Elliott's* (Id. p. 756), flowers more deeply-coloured than the common form.

One of the finest of Gibson's discoveries on the Khasia Hills, and communicated by him to the Chatsworth Gardens in 1837; it was subsequently detected by the Rev. C. Parish in the Moulmein district; it is now known to be widely distributed over Northern India, Assam, Burmah, Siam and Southern China. The variety *rhodoneurum* was sent from Moulmein, by the Rev. C. Parish, in 1867. The sub-variety *candidulum* first appeared in Mr. Barber's collection, at Spondon, near Derby; and *Mr. Elliott's*, in that gentleman's collection at Downs Park Road, Clapton, and also in Sir Trevor Lawrence's, at Burford Lodge, but both are extremely rare. The flowering season of *Dendrobium Devonianum* is from the beginning of May to the middle of June.

D. *dixanthum*.

EUDENDROBIUM—*Calostachya*. Stems somewhat clavate, 24—36 inches high. Leaves linear-lanceolate, grass-green, deciduous. Flowers wholly yellow with a deeper tint on the disc of the lip, produced in racemes of 2—5 from the upper part of the stems; sepals lanceolate, acute; petals oblong, broader than the sepals; lip sub-orbicular, with a short convolute claw, minutely serrate at the margin.

Dendrobium dixanthum, Rehb. in Gard. Chron. 1865, p. 674. Id. XIX (1883), p. 814. *Bot. Mag.* t. 5564.

Communicated from Moulmein to Messrs. Low and Co., in 1864, by the Rev. C. Parish; and still occasionally seen in collections. Major-General E. S. Berkeley invariably found this plant growing with *Dendrobium albo-sanguineum* on the tops of lofty trees. It flowers in June and July. The specific name, from δις, "twice," and ξανθός (*xanthos*), "yellow," refers to the two shades of yellow observable in the flower.

D. *Draconis*.

EUDENDROBIUM—*Formosae*. Stems stoutish, erect, 12—18 inches high. Leaves lanceolate, 3—4 inches long, unequally bilobate at the apex, persistent two years. Flowers in fascicles of two or more from the uppermost joints of the stems, 1½ inches in diameter, ivory-white with some orange-red stripes at the base of the lip; sepals lanceolate, acute; petals broader, oblong-lanceolate, reflexed at the tips; lip three-lobed,

lateral lobes small, rotund; intermediate lobe oval-oblong, with a crisped and minutely toothed margin, and traversed by three longitudinal raised lines.

Dendrobium Draconis, Rehb. in *Bot. Zeit.* 1862, p. 214. *Id. Xen. Orch. II.* p. 130. *Id. Gard. Chron. XIX.* (1883), p. 598. Williams' *Orch. Alb. III.* t. 103. *D. eburneum*, *Bot. Mag. t. 5459* (1864). *Revue hort.* 1883, p. 132.

Also one of the Rev. C. Parish's discoveries in Moulmein, and sent by him to Messrs. Low and Co., in 1862, under the name of *Dendrobium eburneum*, the name by which it is still best known in British collections; the first published description of the plant, however, appeared in Von Mohl's *Botanische Zeitung* for the same year, from the pen of Professor Reichenbach, under the name of *D. Draconis*, which, therefore, has precedence, and must be retained. *D. Draconis* has a wide range in the eastern peninsula of India, it having been reported from Siam, and also from South Cochin China. It usually flowers in May and June.

D. Falconeri.

EUDENDROBIUM—Fasciculata. Stems slender, of various lengths, tumid at the joints, which are 1—2 inches apart, and from the uppermost of which are produced short, spindle-shaped, nodose branches with fascicles of filiform roots, the whole plant presenting the appearance of a confused plexus of stems, branches, roots, and leaves. Leaves linear, acute, 3—4 inches long. Flowers solitary, 2—3 inches in diameter; sepals oblong-lanceolate, white tinged with pale rose, and with a rich amethyst-purple blotch at the tip; petals ovate, broader than the sepals, white heavily tipped with amethyst-purple; lip oval-oblong, obscurely three-lobed, the lateral lobes partially turned over the column at their base; disc rich maroon-purple with a bright orange blotch on each side, and a broad white band in front, the apex rich amethyst-purple like the tip of the sepals and petals.

Dendrobium Falconeri, Hook. in *Bot. Mag.* t. 4944 (1856). Van Houtte's *Fl. des Serres*, t. 1197 (copied from *Bot. Mag.*). Lindl. *Gard. Chron.* 1856, p. 692. *Belg. hort.* 1874, t. 14. *Fl. Mag.* n. s, t. 226.

var.—*giganteum*.

Stems longer and stouter, and furnished with larger and more leaves. Flowers nearly as large again as those of the original type, and remaining much longer in perfection.

D. Falconeri giganteum, Hort. Williams' *Orch. Alb. VI.* t. 257.

Long known as the finest of the *Eudendrobium* section. Its first appearance in European gardens occurred in 1856, when a plant said to have been imported along with others from the mountains of Bhutan, and which had been purchased at an auction in London,

flowered in the collection of Mr. George Reid, at Burnham, in Somerset. In the following year *Dendrobium Falconeri* was sent to Europe, with other orchids, by Simons, who had collected it in Assam and the Khasia district, the habitat of the species. It is somewhat variable in the size and colour of its flowers, hence we have an *albidulum*,* with pallid tips of the floral segments, and a *giganteum* described above, which first appeared among one of our own importations. The species is named in compliment to Dr. Falconer, for some years Director of the Calcutta Botanic Garden. It flowers in May and June.

Cultural Note.—*Dendrobium Falconeri* succeeds best attached to a block of wood or tree-fern suspended near the roof glass of the East India house. Its growing season is from March to October, during which time it should be constantly and liberally supplied with water by syringing. When the season's growth is completed it may be removed to a cooler house, and kept there during the winter months, during which time it should be dipped or syringed once a week, or so often as is sufficient to prevent an excessive shrivelling of the plant.

D. Farmeri.

EUDENDROBIUM—*Calostachys*. Stems 10–18 inches long, clavate, elongated, four-angled, attenuated towards the base into slender foot-stalks. Leaves oval-oblong, acute, 6 inches long, 2–4 in number near the summit of the stems, persistent. Racemes pendulous, lax, many-flowered. Flowers 2 inches across, the sepals and petals pale straw-yellow tinted with rose, disc of lip deep ochreous yellow; sepals oblong, acute; petals broadly oval; lip sub-orbicular, contracted to a short claw, above which it is sinuate on each side, upper surface downy.

Dendrobium Farmeri, Paxt. *Mag. Bot. XVII.* p. 241 (1849). Van Houtte's *Fl. des Serres VII.* t. 741 (copied from Paxt. Mag.). *Bot. Mag.* t. 4659. Linden's *Pesc. t. 4. Belg. hort.* 1860, p. 321. Jennings' *Orch.* t. 24.

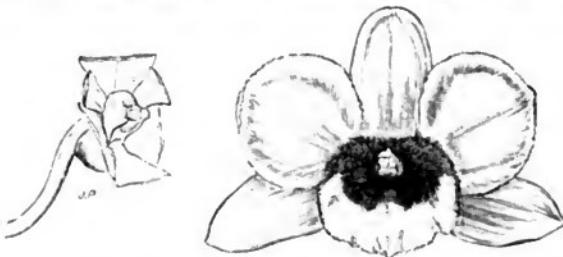
sub-var.—*albiflorum*† (*Belg. hort.* 1860, p. 321; Regel's *Gartenfl.* 1868, t. 595; Van Houtte's *Fl. des Serres*, 1882, t. 2461), flowers white, with disc of lip orange-yellow; *aureoflavum* (*Bot. Mag.* t. 5451; Williams' *Orch. Alb.* III. t. 99), flowers golden yellow, with disc of lip deep yellow.

Native of the eastern part of the lower Himalayan zone, and the Khasia Hills, also in the forests of Moulmein in British Burmah, whence it has been frequently imported. It was first introduced in 1847, in which year it was sent by Dr. McClelland from the

* Rehb. in *Gard. Chron.* V. (1876), p. 688.

† This is probably the same form as that known in some British collections under the name of Woolley's variety.

Calcutta Botanic Garden to Mr. W. G. Farmer, of Nonsuch Park, in Surrey, to whom it is dedicated. The sub-variety *albiflorum* is from the plains and low hills near Moulmein, and first appeared in the collection of Messrs. Jacob Makoy and Co., at Liége, in the spring of 1860; *aureo-flavum* is from the Arracan Mountains, and was introduced by Messrs. Low and Co. in 1863, through the Rev. C. Parish; it closely resembles *Dendrobium chrysotoxum*, from which



Dendrobium Farmeri.

it may be distinguished by its quadrangular stems, looser racemes, and differently shaped lip. Ever since its first introduction, *D. Farmeri* has been regarded with high favour amongst horticulturists as one of the most distinct and beautiful of the genus, and has thence received especial attention at the hand of the cultivator, the grand specimens in the collection of Baron Schroeder, at The Dell, near Staines, being a conspicuous instance of success in that direction. It usually flowers in May and June, but not infrequently much earlier.

D. *fimbriatum*.

EUDENDROBIUM—*Calostachys*. Stems 4—5 feet long, sometimes less, cane-like, furnished along the upper halves with broadly lanceolate, acute leaves, 6 inches long. Racemes loose and pendulous, 6 inches long, bearing 7—12 flowers, 2—3 inches in diameter. Sepals elliptic-oblong; petals oval-oblong, ciliolate, broader than the sepals, both sepals and petals bright orange-yellow; lip orbicular, with a short convolute claw and fimbriate margin, bright yellow with an orange-yellow disc.

Dendrobium fimbriatum, Hook. Exotic Fl. t. 71 (1831). Lindl. Gen. et Sp. Orch. p. 83. Paxt. Mag. Bot. II. p. 172 (1836). Id. Fl. Gard. III. t. 84.

var.—*oculatum*.

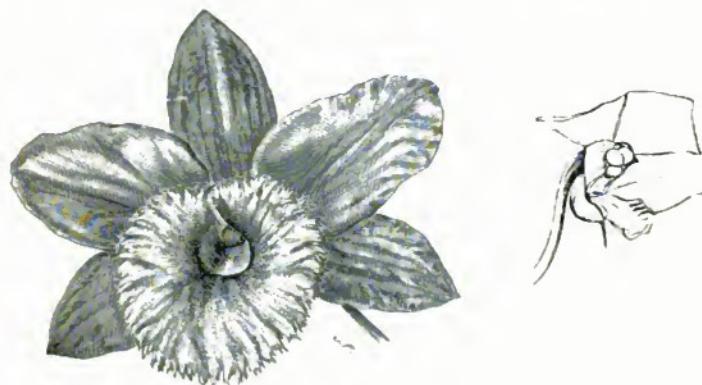
Stems usually shorter, more slender, and bearing somewhat smaller flowers, which have a large maroon-red spot on the lip.

D. fimbriatum oculatum, Bot. Mag. t. 4160 (1845). Paxt. Fl. Gard. III. t. 84 (1852). Illus. hort. I. t. 15 (1854). Warner's Sel. Orch. II. t. 19. D. Paxtonii, Paxt. Mag. Bot. VI. p. 169 (1839), not Lindl. Van Houtte's Fl. des Serres, VII. t. 725 (1851).



Dendrobium Farmeri.

The original *Dendrobium fimbriatum* was discovered by Wallich on the lower ranges of the Nepalese Himalayas in 1820, and was sent by him to the Liverpool Botanic Garden, where it flowered for the first time in Europe in 1822. The variety *oculatum* was sent by Gibson to Chatsworth from the Khasia Hills in 1837; it had, however, been gathered by Griffith in Burmah in the year preceding, and where, many years afterwards, it was found by Colonel



Dendrobium fimbriatum.

Benson in the plains and on the mountains east of Prome, so that the geographical range of the species is very considerable. The typical *D. fimbriatum*, the finest of the orange-yellow Dendrobes, is not now often seen in British collections, but the variety *oculatum* is generally cultivated; it is remarkably floriferous, as many as 123 racemes bearing 1,216 flowers having been counted on a single plant.*

D. *Findlayanum*.

EUDENDROBIUM—*Fasciculata*. Stems 15—20 inches long, with yellowish green, compressed, club-shaped joints, 2—3 inches long, very slender at their base. Leaves from the base of the swollen nodes, oblong-lanceolate, acute, 3 inches long, deciduous. Flowers 2—3 inches in diameter, generally in pairs, on pale lilac pedicels, produced from the upper end of the swollen nodes, pale lilac suffused with white, except the lip, which is ochreous yellow, fading off to white at the

* Communicated to us by Mr. Bland, gardener to S. K. Mainwaring, Esq., of Oteley Park, Shrewsbury.

margin; sepals oblong-lanceolate; petals elliptic-oblong, much broader; lip clawed, with an ovate-cordate blade.

Dendrobium Findleyanum (*lapsu calami*, Findleyanum), Parish et Rchb. in *Trans. Linn. Soc.* XXX, p. 149, 1873. Rchb. in *Gard. Chron.* VII. (1877), p. 334. *Bot. Mag.* t. 6438.

A remarkable species discovered by Mr. James Findlay, a merchant trading in Burmah, while on a journey to Zimmè, in 1867—68, and who brought a single plant to the Rev. C. Parish, at Moulmein, by whom it was sent to Kew as a dried specimen. Its habitat is on the rocks on the higher parts of the mountain range separating Burmah from Siam, whence it was imported some years later. It flowered for the first time in this country in the collection of Sir Trevor Lawrence, Bart., at Burford Lodge, in the spring of 1877.

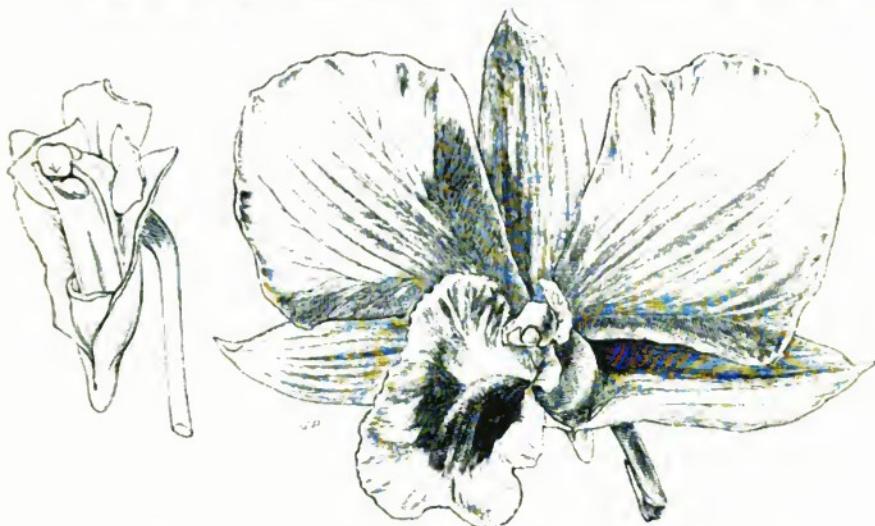
D. formosum.

EUDENDROBIUM—Formosae. Stems 12—18 inches long, cylindric, nearly as thick as the little finger, leafy, and clothed with blackish hairs when first developed, but furrowed and bare when mature. Leaves ovate-oblong, 5 inches long, aamplexicaul, unequally bilobate at apex. Flowers white with an orange-yellow blotch on the lip, 3—4 inches in diameter, produced in fascicles of 3—5 from the axils of the uppermost leaves; sepals elliptic-oblong, apiculate, keeled behind; petals obovate, apiculate, as broad again as the sepals; lip obovate-oblong, retuse, turned over the column at the base, with a broad raised longitudinal central band and erose anterior margin. Column triquetral, white.

Dendrobium formosum, Roxb. *Fl. Ind.* III. p. 485 (1832). Lindl. *Bot. Reg.* 1839, t. 64. *Paxt. Mag. Bot.* VI. p. 49. Van Houtte's *Fl. des Serres* t. 226. *Id.* t. 1633-4 (var. *giganteum*). Williams' *Orch. Abb.* VII. t. 308.

Dendrobium formosum has been long known as the finest of the white Dendrobes; individual flowers have been brought under our notice, of which the petals were $2\frac{1}{2}$ inches broad, and the funnel-like lip 4 inches long. It was introduced to European gardens from the Khasia Hills by Gibson, who sent it to Chatsworth in 1837, where it flowered in May in the following year. It is widely distributed over north-eastern India and Burmah, from Sylhet and the Garrow Hills southwards as far as Tavoy on the Tenasserim coast. Roxburgh, its first discoverer, gathered it in Sylhet and on the Garrows. In British Burmah it is abundant from Moulmein to Tavoy, especially about Amherst, where the native women use the flowers as an ornament for the head. Some of the finest forms are found in the Mangrove swamps of the Andaman Islands,

along the sea-coast, where in stormy weather the plants must be covered with sea spray. As in these islands there is rain during eleven months of the year, this Dendrobium has practically no resting season.* Colonel Benson observes† that in British Burmah he had never seen *D. formosum* growing at any elevation above the plains worthy of notice, nor at any great distance from the sea. On ascending the mountains more inland we come across its



Dendrobium formosum.

co-species *D. Infundibulum*, *D. eburneum* (*Draconis*), and *D. Jamesianum*, which in his opinion barely deserve a separate specific name. The favourite habitat of *D. formosum* is on trees growing in a laterite (brick-clay) soil; it does not seek shady places beyond what is given by the trees when in leaf. During the months of February, March, and April, the plants are exposed to an atmosphere of 43° C. (110° F.) in the shade, when the stems are much reduced in size by the heat.

D. fuscatum.

EUDENDROBIUM—*Calostachyae*. “Stems 2—3 feet long, nearly cylindric. Leaves 4—6 inches long, sessile, ovate-lanceolate, acuminate, deciduous. Racemes drooping, with a zig-zag rachis, 6—15 flowered. Flowers 2

* Major-General E. S. Berkeley, MS.

† Gard. Chron. 1870, p. 763.

inches in diameter, deep orange-yellow with two maroon spots at the base of the lip; sepals and petals nearly equal and similar, broadly oblong; lip oblate-orbicular, villous on the surface, fimbriate on the margin."*

Dendrobium fuscum, Lindl. Jour. of Linn. Soc. III. p. 8 (1858). *Bot. Mag.* t. 6226.

Discovered by Sir J. D. Hooker in the hot valleys of the Sikkim Himalayas and on the Khasia Hills in 1848—50, where it is far from common. Its nearest affinities are *Dendrobium chrysanthum* and *D. fimbriatum*, from both of which it may be distinguished by its smaller flowers of a less bright hue, and from the latter chiefly by the double spot on the lip.

D. Fytchianum.

STACHYOBIA—*Speciosæ*. Stems slender, erect, 12—18 inches high. Leaves oblong lanceolate, acute, 3—4 inches long, deciduous. Racemes pseudo-terminal or lateral, 10—15 flowered. Flowers 1½—2 inches in diameter, white, except the side laciniae of the lip which are tinted with rosy purple; sepals lanceolate; petals obovate, nearly three times as broad as the sepals; lip three-lobed, the lateral lobes small, incurved; the intermediate lobe broadly obovate, apiculate, and having tufts of yellowish hairs at the base.

Dendrobium Fytchianum, Batem. in Gard. Chron. 1864, p. 100. *Bot. Mag.* t. 5444 (*D. barbatulum*).

var.—*roseum*.

"Sepals and petals rose colour; the lateral lobes and base of middle lobe of labellum crimson-purple; the villous process at the base deep purple tipped with orange."

D. Fytchianum roseum, E. S. Berkeley, in Gard. Chron. I. s. 3 (1887), p. 209.

A beautiful species, much resembling the better known *Dendrobium barbatulum*, with which it has sometimes been confounded, but from which it is clearly distinct in its more slender stems that are not swollen at the base; in its narrower sepals, broader petals, and totally different lip with coloured side lobes. It was discovered in 1863, by the Rev. C. Parish, growing on trees over-hanging one of the rivers that flow through the Moulmein district of British Burmah, and introduced by Messrs. Low and Co. soon afterwards. It is named in compliment to General Fytch, who was accompanying Mr. Parish at the time of the discovery. The variety was gathered by Major-General E. S. Berkeley, in 1886, in Burmah, in

* Abridged from *Bot. Mag.* sub. t. 6226. See also note under *Dendrobium Gibsonii*.

a locality 200 miles distant from the habitat of the typical *D. Fytchianum*; this usually flowers in April and May, the variety much earlier.

D. Gibsonii.

EUDENDROBIUM — *Calostachys*. Stems slender, 24—30 inches high, slightly dilated in the middle. Leaves lanceolate, acuminate, 5—6 inches long. Racemes from the upper nodes only, 5—7 or more flowered. Flowers golden yellow with two maroon-crimson spots on the disc of the lip; sepals and petals similar, oval-oblong, spreading; lip oblate-orbicular with convolute claw and fimbriate margin.

Dendrobium Gibsonii, Paxt. *Mag. Bot.* V. p. 69 (1838). Paxt. *Fl. Gard.* II. p. 133 (1852).*

A handsome species, somewhat resembling *Dendrobium fimbriatum oculatum*, from which it differs chiefly in its shorter and more slender stems, in its smaller flowers, of which the petals are not ciliate, in its broader lip and disc, with two spots instead of one, and in the fimbriation of the lip being simple and not branched. It was discovered by Gibson on the Khasia Hills, while collecting orchids in India for the Duke of Devonshire, in 1836.

D. gratiosissimum.

EUDENDROBIUM — *Fasciculata*. Stems slender at the base, slightly thickened upwards, swollen at the nodes, 12—18 inches long. Leaves lanceolate, acute, 3—4 inches long, deciduous. Flowers in fascicles of twos and threes from the leafless stems, 2—2½ inches across; sepals and petals white tipped with pale rose-purple, the former oblong lanceolate, the latter broader, ovate-lanceolate; lip broadly ovate, acute, with entire edge, white with a rose-purple blotch at the apex, and with a large yellow circular blotch on the disc streaked with orange.

Dendrobium gratiosissimum, Rchb. in *Bot. Zeit.* 1865, p. 99. Id. *Xen. Orch.* II. p. 211. *D. Bullerianum*, *Bot. Mag.* t. 5852 (1867).

One of the numerous discoveries of the Rev. C. Parish in Moulmein, and sent by him to Messrs. Low and Co., in 1865. It is now rarely seen in the orchid collections of Europe; it is probably rare in its native country. Its nearest affinities are *Dendrobium Boxalli*, *D. crystallinum*, and *D. Devonianum*, resembling the last-named in habit, and the first in the size and colour of its flowers; it is best known in British collections under the name of *D. Bullerianum*.

* It has still to be determined whether *Dendrobium Gibsonii* (Paxt.), *D. fuscatum* (Lindl.), and *D. binocularis* (Rchb.), are specifically distinct, or are varieties, or even synonyms of one species. In the absence of sufficiently reliable materials for comparison, we are obliged to leave them as they are for the present.

D. Griffithianum.

EUDENDROBIUM—*Calostachys*. Stems 12—18 inches high, obscurely four-angled, furrowed, attenuated below into a long, slender foot-stalk, and bearing near their summit 3—5 oval-oblong, extremely leathery, deep green leaves, the broadest of which are 2 inches wide. Racemes pendulous, 8—10 inches long, many-flowered. Flowers nearly 2 inches across, bright yellow, the lip orange-yellow; sepals oval-oblong; petals broader, sub-orbicular; lip orbicular, with a convolute claw, margin fringed, very papillose above.

Dendrobium Griffithianum, Lindl. in Bot. Reg. sub. t. 1756 (1835). Rchb. Gard. Chron. VII. (1877), p. 590.

var.—Guibertii.

Stems less densely tufted, and more abruptly attenuated below. Leaves more coriaceous. Racemes longer, with larger flowers of brighter colours.

D. Griffithianum Guibertii, supra. *D. Guibertii*, Rev. hort. 1876. Illus. hort. n. s. t. 258. De Puydt, Les Orch. t. 16.

A rare species discovered by Griffith in British Burmah in 1833—4 (locality not given), but not introduced till upwards of forty years afterwards. Its nearest affinities are the equally rare *Dendrobium Palpebrae* and the well-known *D. densiflorum*; from the former it differs in the colour of its flowers and in the structure of the lip; from the latter by its usually shorter stems, with deeper green, more leathery leaves, and by its more lax racemes of flowers, that are larger, and have broader segments. It flowers in May and June. The variety, which is also extremely rare, appeared in the collection of M. Guibert, an amateur of Paris, about the year 1876. M. Guibert's plant was probably the only one ever imported.

D. Harveyanum.

EUDENDROBIUM—*Calostachys*. Stems fusiform, 6—9 inches long, but sometimes much shorter. Leaves in twos and threes at the summit of the stems, ovate-oblong. Peduncles from the uppermost joints, 3—4 or more flowered. Flowers about 2 inches in diameter, bright canary-yellow; sepals lanceolate, acute; petals elliptic-oblong, furnished with a flexuose, branched fimbriation, similar to that of the lip of *Dendrobium Brymerianum* but less pronounced; lip orbicular, concave, with fringed margin and papillose upper surface; spur short, retuse.

Dendrobium Harveyanum, Rchb. in Gard. Chron. XIX. (1883), p. 624.

Introduced in 1883 from British Burmah, by the Liverpool Horticultural Company. It is dedicated to Mr. E. Harvey, of Aigburth, near Liverpool, in whose collection it flowered for the first time in this country, in May of the same year. Its most striking characteristic is seen in its curiously fimbriated petals.

D. Hookerianum.

EUDENDROBIUM—*Calostachye*. Stems rod-like, 6—8 feet long, swollen at the base into small pseudo-bulbs. Leaves oblong-lanceolate, acuminate, 4—6 inches long. Flowers 3—4 inches across, in pendulous racemes of 9—12 or even more on each, borne on the leafing stems and also on the older leafless ones, bright golden yellow, with two maroon spots near the base of the lip; sepals and petals similar, oblong, acute; lip with a convolute claw and broadly oval limb, which is velvety on the upper surface and fringed at the margin. Column short, whitish.

Dendrobium Hookerianum, Lind. in Jour. Linn. Soc. III. p. 8 (1858). Bot. Mag. t. 6013. Rehb. in Gard. Chron. II. s. 3 (1887), p. 616. D. Chrysotis, Rehb. in Gard. Chron. 1870, p. 1811. *Fl. et Pomol.* 1871, p. 145. *Illus. hort.* 1873, t. 155. Warner, *Sel. Orch.* III. t. 6.

A superb species first discovered by Sir Joseph Hooker, "in Sikkim, in 1848, growing on trees in hot valleys at an elevation of 1,000—5,000 feet above the level of the sea." It was introduced by the late Mr. John Day, who informed us that it is also a native of the Assam Hills, where it was discovered by his nephew, Captain Williamson, who first sent it to England in 1868, and again in several succeeding years; it appears to be plentiful in the place where it grows. It flowered for the first time in this country in the horticultural establishment of Messrs. Brooks and Co., at Manchester, in September, 1870, the plant being one of those received by Mr. Day, who had, however, himself been unsuccessful in flowering any of the plants retained for his own collection at Tottenham; a difficulty frequently experienced by other cultivators. Its nearest ally is *Dendrobium fimbriatum*, from which it differs chiefly in its larger flowers, that are borne on leafing stems and appear at different seasons of the year, and in the almost equal sepals and petals with entire margins.

D. Huttonii.

EUDENDROBIUM—*Fasciculata*. Stems slender, erect, 20—30 inches long, leafy along the upper half. Leaves sessile, linear-lanceolate, acute, 3 inches long. Flowers solitary, or in fascicles of twos and threes from the uppermost joints, white bordered with purple, the border on the lip deeper in colour than on the other segments; sepals and petals oval-oblong; lip obovate-oblong; spur cylindric, obtuse.

Dendrobium Huttonii, Rehb. in Gard. Chron. 1869, p. 686.

A native of Timor, in the Malayan Archipelago, where it was discovered by the late Henry Hutton, while collecting for us in 1868.

D. Infundibulum.

EUDENDROBIUM—*Formosae*. Stems cylindric, 15—24 inches long, somewhat thicker than an ordinary writing pencil. Leaves varying from ovate-lanceolate to linear-lanceolate, 3 inches long. Peduncles pseudo-terminal, 3—5 flowered. Flowers 3 inches in diameter, white with a blotch on the lip that varies in colour from cinnabar-red to pale sulphur-yellow; sepals elliptic-oblong, acute; petals sub-rhomboidal, more than twice as broad as the sepals; lip oblong when spread out, three-lobed; the lateral lobes convolute over the column, giving the lip the form of a wide-mouthed funnel; spur extinguisher-shaped, nearly as long as the pedicel.

Dendrobium Infundibulum, Lindl. in Jour. of Linn. Soc. III. p. 16 (1858). Batem. in Gard. Chron. 1862, p. 1194. Bot. Mag. t. 5446. Illus. hort. 1874, t. 172. The Garden, XXII. (1882), t. 368. D. moulmeinense, Hort. Low.

var.—Jamesianum.

Stems stouter and more rigid. Lip of flower differently formed, especially the side lobes, which are asperous on their inner surface; disc cinnabar-red.*

D. Infundibulum Jamesianum, supra. D. Jamesianum, Rehb. in Gard. Chron. 1869, p. 554. Fl. and Pomol. 1869, p. 187. Williams' Orch. Alb. V. t. 221.

Discovered by Thomas Lobb on the mountains of Moulmein, while collecting orchids for us in British Burmah, and from whose specimens it was partially described by Dr. Lindley in the Journal of the Linnean Society No. 9, 1858. It does not appear to have been introduced to European gardens till 1862, when it was sent to Messrs. Low and Co. by the Rev. C. Parish. It occurs on the mountains of Moulmein at 2,500—5,000 feet elevation, on deciduous or partially deciduous trees, and also in some places on rocks; under the last-named circumstance its growth is considerably modified, the stems being compressed and thickened into almost globular pseudo-bulbs. At the above-mentioned elevation the thermometer ranges in the shade from about 24° C. (75° F.) in the mid-day to 5° C. (40° F.), or even lower in the morning at sun-rise;† the annual rainfall is there exceedingly heavy, being more than 200 inches in the lower part of its range. The variety *Jamesianum* was sent to us, in 1869, by Colonel Benson, from the mountains west of Prome. It was subsequently found by Major-General E. S. Berkeley, on the hills which separate Burmah from Siam, where it grows on rocks with plumper and shorter stems than on the Arracan Mountains, and where it affixes

* Fide Rehb. loc. cit.

+ Colonel Benson in Gard. Chron. 1870. p. 763.

itself chiefly to trees.* It was dedicated by Reichenbach as a distinct species to the late Mr. James Veitch.†

Cultural Note.—*Dendrobium Infundibulum* and its variety are, botanically, nothing more than alpine forms of *D. formosum*, and they therefore require a cultural treatment consonant with the higher altitude and corresponding lower temperature in which they grow in their native country. The conditions most suitable for them in the orchid houses of Europe are found to be best fulfilled either in the coolest and lightest part of the intermediate or Cattleya house, or still better in the Odontoglossum house, which many cultivators prefer; a moist atmosphere is also essential during their growing season.

D. Japonicum.

EUDENDROBIUM—Fasciculata. Stems tufted, 6—12 inches long, slender, attenuated downwards. Leaves linear-lanceolate, acute, 1—2 inches long, deciduous. Flowers fragrant, 1½ inches in diameter, solitary or in pairs, white, speckled with purple at the base of the lip; sepals oblong, acute; petals similar but broader; lip ovate-oblong, acuminate, reflexed.

Dendrobium japonicum, Lindl. Gen. et. Sp. Orch. p. 89 (1831). *Bot. Mag.* t. 5482. *Onychium japonicum*, Blume, Bijdr. 328.

A species with small, white, fragrant flowers, common throughout southern Japan, especially in the Oki group of islets, and the islands in the Corean Channel. It has been in cultivation since 1860.

D. Jenkinsii.

STACHYOBIA—Speciosa. A dwarf tufted plant. Stems pseudo-bulbous, much crowded, ovoid, compressed, with a rib on the flattened sides, ¾—1½ inches long, monophyllous. Leaves oval-oblong, an inch long, leathery. Flowers large for the size of the plant, usually solitary on filiform peduncles, 1½ inches long, orange-yellow with the disc of the lip darker; sepals oval; petals rhomboid, much broader; lip with a broad claw and orbicular blade, downy on the upper surface.

Dendrobium Jenkinsii, Wallich. *Lindl. Bot. Reg.* 1839, t. 37. *Warner's Sel. Orch.* II. t. 28.

Discovered by Captain Jenkins, a military officer in the service of the East India Company, growing in large tufts on trees about

* Gard. Chron. I. s. 3 (1887), p. 736.

† The colour of the spot on the lip of *Dendrobium Infundibulum* varies from cinnabar-red to pale flesh; it not only varies in different plants, but it has also been observed to vary in the same plant in different seasons. Those plants whose flowers have the red spot are often but erroneously called *D. Jamesianum*, but the typical *Jamesianum*, now seldom seen, may be recognised by the characters indicated above.

Gualpara, in Assam, and sent by him to Sir Charles Lemon, in 1836; it was also communicated by that officer about the same time to Dr. Wallich, who sent plants to Messrs. Loddiges, in whose nursery it flowered in 1838; it has since been detected by Major-General E. S. Berkeley in the interior of Burmah, in districts where the rain-fall is much less than in other parts of the country. It flowers profusely in March and April when affixed to blocks of wood suspended near the roof glass of the Cattleya or intermediate-house.

D. Kingianum.

STACHYOBIA—*Speciosa*. A dwarf tufted plant. Stems pseudo-bulbous, 2—3 inches long, dilated at base, angulate, attenuated upwards and bearing at their summit 2—5 oblong-lanceolate leaves, 2—3 inches long. Racemes slender, few flowered. Flowers less than an inch across; sepals and petals whitish edged, and streaked with pale purple, the former ovate, acute, the latter similar but much narrower; lip three-lobed, white streaked and spotted with purple; the side lobes prominent, oblong, obtuse; middle lobe sub-reniform, apiculate; the disc with three raised lines; spur blunt, yellowish at the tip; crest tri-lamellate, yellow.

Dendrobium Kingianum, Lindl. in Bot. Reg. 1844, misc. 18. *Id.* 1845, t. 61. Part. Mag. of Bot. XII. p. 97. Bot. Mag. t. 4527.

A native of South Queensland, Australia, in which colony it was discovered, in 1844, by Mr. J. T. Bidwill, one of the early botanical explorers of Australia and New Zealand, and for many years a correspondent of the late Mr. James Veitch Senior, of Exeter; it was communicated by him to the Royal Gardens at Kew, and other places shortly afterwards. A sub-variety called *pallidum* has white flowers with a few purple stripes on the labellum.

D. lasioglossum.

EUDENDROBIA—*Fasciculata*. Stems slender, 12—20 inches long, attenuated above and below. Leaves lanceolate, acuminate, 3—5 inches long. Flowers 1½ inches in diameter, in fascicles of twos and threes from the uppermost nodes, white with some reddish streaks on the side lobes of the lip, on the disc of which is a tuft of orange-yellow hairs; sepals ovate; petals a little broader; lip funnel-shaped, three-lobed, the side lobes rotund with notched edges, the intermediate lobe sub-quadrata, reflexed with undulate margin; spur two-lobed.

Dendrobium lasioglossum, Rehb. in Gard. Chron. 1868, p. 682. Bot. Mag. t. 5825.

" Discovered by Colonel Benson in the forests of Burmah, and communicated by him to us, and to the Royal Gardens at Kew, where—and in the collection of Mr. Wentworth Buller—it flowered

in February, 1868."* The specific name, from *λάσιος* (lasios), "hairy," and *γλῶσσα* (glossa), "tongue," in orchidology "lip," refers to the hairy appearance of the labellum.

D. leucolophotum.

STACHYTOBIA—Speciosa. Stems stoutish, erect, 12—18 inches high, pale cinereous brown. Leaves not seen. Peduncles from one of the uppermost joints, slender, nodding, 18 inches long, bearing a many-flowered, one-sided raceme along its distal half. Flowers about an inch in diameter, snow-white with the side lobes and base of lip pale green; sepals linear-oblong, apiculate, keeled behind; petals much broader, obovate, obtuse; lip produced at the base into a short, obtuse spur, three-lobed, the side lobes oblong, incurved, meeting at their edges; middle lobe narrowly oblong. Column greenish.

Dendrobium leucolophotum, Rehb. in *Gard. Chron.* XVIII. (1882), p. 552.

Discovered by Curtis in the Malay Archipelago, locality not known, and introduced by us in 1881; its chief recommendation is its chaste white flowers that appear in November and December, when few other Dendrobes are in bloom. The specific name, from *λευκός* (leukos), "white," and *λόφος* (lophos), "a tuft of long hair," as the mane of a horse, is somewhat fanciful, but is evidently intended to refer to the long one-sided racemes of white flowers.

D. Linawianum.

EUDENDROBIUM—Fasciculata. Stems erect, 12—18 inches long, clavate, slightly compressed and two-angled, with joints 1—1½ inches apart, the internodes pale yellowish green, and swollen below each joint. Leaves narrow-oblong, 3 inches long, obliquely emarginate, persistent two years. Flowers 2 inches in diameter, in fascicles of twos and threes from the uppermost joints, on pale purplish pedicels; sepals ovate-oblong, the lateral two falcate; petals ovate, as broad again as the sepals; both sepals and petals rosy purple fading off to white at the base; lip small, ovate, convolute at base, reflexed at apex, obscurely three-lobed; basal portion white with two purple spots on the disc, anterior portion wholly purple.

Dendrobium Linawianum, Rehb. in *Walp. Ann.* VI. p. 284 (1861). Williams' *Orch. Alb.* III. t. 141. *D. moniliforme*, *Bot. Reg.* t. 1814 (1830). *Bot. Mag.* t. 4153. *Part. Mag. Bot.* III. t. 71.

A native of China and Japan, whence it was introduced by the Horticultural Society of London in 1824, and twenty years later it was sent to the Royal Gardens at Kew, by Dr. Wallich. No localities are recorded in which the plant has been gathered, nor

* *Bot. Mag.* sub. t. 5825.

does it appear to have been since imported, or if so but very seldom, as the plant has always been a comparatively rare one both in British and continental collections. Dr. Lindley described it in the *Botanical Register* under the name of *Dendrobium moniliforme*, quoting Swartz as the author, the name by which it is still best known in gardens; Professor Reichenbach failing to identify it with the *D. moniliforme* of Swartz, gave it the name under which it is here described.*

D. lituiflorum.

EUDENDROBIUM—*Fasciculata*. Stems 18—24 inches long, greyish white, pendulous. Leaves linear-lanceolate, 3—4 inches long, deciduous. Flowers 2—2½ inches across, usually in pairs from the uppermost joints, but sometimes 3—5 fascicled; sepals oblong-lanceolate, acute, amethyst-purple, much paler at the base; petals ovate-oblong, much broader and more richly coloured; lip curved like a trumpet with the bell upwards; claw broad, convolute over the column; disc of limb downy maroon-purple surrounded by a white zone, anterior margin purple.

Dendrobium lituiflorum, Lindl. in *Gard. Chron.* 1856, p. 372. *Warner's Sel. Orch. II.* t. 3. *Bot. Mag.* t. 6050. *D. lituiflorum robustius*, Rehb. in *Xen. Orch. III.* p. 36, t. 214. *D. Hanburyanum*, Rehb. in *Bonpl. IV.* p. 329.

var.—candidum.

Flowers larger, with sepals and petals pure white and lip pale sulphur-yellow.

D. lituiflorum candidum, Rehb. in *Gard. Chron.* XIII. (1880), p. 585. *D. lituiflorum albiflorum*, Hort.

var.—Freemanii.

Stems short, stiff and erect; sepals and petals deep purple; zone of lip sulphur-yellow.

D. lituiflorum Freemanii, Rehb. in *Gard. Chron.* VIII. (1877), p. 744. *D. Freemanii*, Hort.

A beautiful species, nearly allied to *Dendrobium nobile*. It first became known in British gardens in 1856, when it flowered in the collection of the late Mr. Robert Hanbury, at The Poles, near Ware, but its native country was not recorded at the time. It is now known to occur in the warm valleys throughout Arracan; it has also been collected in Assam, whence it spreads eastwards as far as Bhamo, in Upper Burmah. The variety *candidum*, which is in cultivation at Burford Lodge, is distinct and beautiful; *Freemanii* is the Assamese

* The following is Swartz's diagnosis of *Dendrobium moniliforme*, published in the *Transactions of the Stockholm Academy of Science*, in 1800:—" *D. moniliforme*—Caule tereti simplici basi tuberoso, foliis linear-lanceolatis, spicis erectis, floribus remotis alternis solitariis processibus obtusis." It cannot be said that this brief description is applicable to the *D. moniliforme* of Lindley, nor is it easy to say which known species is referable to it.

form, and a third variety, called *robustius* by Professor Reichenbach on account of its more robust stems, was introduced by Messrs. Low and Co. from Burmah. *D. lituiflorum* and its varieties usually flower in April and May. The specific name, from *lituus*, "a sort of trumpet," refers to the form of the lip.

D. Loddigesii.

EUDENDROBIUM—*Fasciculata*. A dwarf, dense, confused plant. Stems about as thick as a goose-quill, 3—4 inches long, thickened above, produced from a creeping rhizome. Leaves oblong-lanceolate, acute, 1½—2 inches long. Flowers solitary, about 1½ inches in diameter, on slender pedicels about as long as the leaves; sepals and petals pale rosy lilac, the former oblong, the latter much broader, ovate; lip with a short convolute claw and orbicular fringed blade, which has a larger orange-yellow disc bordered with pale rosy lilac. Column white above and purple below the stigmatic fovea.

Dendrobium Loddigesii, Rolfe in Gard. Chron. II. s. 3 (1887), p. 155. *D. pulchellum*, Loddiges' Bot. Cab. t. 1935 (1833). Maund. Bot. I. t. 5. *Bot. Mag* t. 5037.

A beautiful species, of creeping habit, introduced by Messrs. Loddiges, in 1832—33, whose origin and name have been involved in obscurity and confusion almost ever since. It has been mixed up and confounded with other species, especially with the *Dendrobium pulchellum* of Roxburgh (1830), which has never been introduced into the orchid collections of Europe. So long ago as 1858, Sir William Hooker (*Bot. Mag.* sub. t. 5037), expressed a doubt as to the identity of the plant in cultivation, under the name of *D. pulchellum*, with the original *D. pulchellum* of Roxburgh, on account of its totally disagreeing in habit and other particulars, and it was not till quite recently that the difficulty has been cleared up; the merit of accomplishing this is due to Mr. R. A. Rolfe, of the Kew Herbarium, from whose article, published in the *Gardeners' Chronicle*, loc. cit. supra., we extract the following:—

"The confusion began with Loddiges, who figured in his *Botanical Cabinet*, in 1833, as *Dendrobium pulchellum*, the plant still known in gardens under that name, which is far from being Roxburgh's plant. Loddiges says it is a native of India, in which, however, he was doubtless simply following Lindley. Maund next figures the same plant from a specimen which flowered in Loddiges' collection at Hackney, stating that it is a native of Sylhet, and was introduced about 1829 by the Horticultural Society. In 1840, *D. Deronianum* had been described and figured in Paxton's *Magazine of Botany*, also in the *Botanical Magazine*, thus furnishing the materials for still further

increasing the confusion. In 1858, Lindley, in "Contributions to the Orchidology of India" (*Journ. Linn. Soc.*), again had to deal with *D. pulchellum*, which he did by including under that name both the plant of Loddiges and *D. Devonianum* of Paxton. Finally, Professor Reichenbach, in Walper's *Annales*, rescued *D. Devonianum*, which he established as a variety of *D. pulchellum*. The two are, however, not only quite distinct in their flowers, but totally dissimilar in habit, stature, and leaves, and cannot be regarded as forms of one species."

Finally, the plant is not a native of India at all, but is of Chinese origin, specimens gathered in the island of Hainan having been recently sent to Kew by Mr. Charles Ford, of the Botanic Garden at Hong-Kong.

D. longicornu.

EUDENDROBIUM—*Formosae*. Stems slender, 8–12 inches high. Leaves linear-lanceolate, acute, 2–2½ inches long, deciduous. Flowers solitary or in twos and threes, not fully expanding; sepals and petals sub-equal, elliptic-oblong, transparent white; lip funnel-shaped, with the anterior margin fimbriate, white with a raised broad central band, which is orange-red, but sometimes pale yellow, with divergent lateral streaks of the same colour as the band; spur slender.

Dendrobium longicornu, Lindl. Gen. et. Sp. Orch. p. 80 (1831). *Bot. Reg.* t. 1315.

A native of Sylhet and the lower Himalayan zone, from Nepaul to Assam, discovered in the early part of the present century by Dr. Wallich, and introduced by him, in 1823, to the Horticultural Society's Garden at Chiswick, where it flowered in the spring of the following year. It has also been detected by Major-General E. S. Berkeley, near Tomyo in Burmah. Although one of the commonest of East Indian Dendrobiums, it is not so much in repute among orchid amateurs as the larger-flowered species of its section, *Dendrobium formosum*, *D. Draconis*, etc.

D. Lowii.

EUDENDROBIUM—*Formosae*. Stems slender, a foot or more high, leafy along the upper half. Leaves ovate-oblong, obliquely emarginate. Flowers 1½ inches in diameter, in fascicles of 3–5 from the uppermost joints, on pedicels coloured like the perianth; sepals and petals buff-yellow, oval-oblong, the petals undulate and broader than the sepals; lip distinctly three-lobed, the lateral lobes oblong, erect, pale buff-yellow stained with red at the apex; the middle lobe oblong, reflexed, pale buff-yellow traversed longitudinally by six lines of long red hairs springing from a crimson base; spur long, funnel-shaped.

Dendrobium Lowii, Lindl. in *Gard. Chron.* 1861, p. 1046. *Bot. Mag.* t. 5303.
Van Houtte's *Fl. des Serres*, t. 2395 (copied from *Bot. Mag.*).

A beautiful species, discovered by Mr. Hugh Low, about the year 1860, in north-west Borneo, "on a mountain at an elevation of 3,000 feet, growing on trees." It was introduced by Messrs. Low and Co., of Clapton, in the following year; it is still a rare plant in British collections.

D. luteolum.

EUDENDROBIUM—*Fasciculata*. Stems erect, 12—18 inches high, somewhat thicker than an ordinary writing pencil, greyish white, and furrowed. Leaves linear-lanceolate, acute, 3—4 inches long. Flowers 2 inches in diameter, in lateral racemes of 2—4 each, of a uniform primrose-yellow except a few reddish streaks on the lip; sepals elliptic-oblong; petals broader, oval; lip three-lobed, the lateral lobes rotund, erect; the middle lobe oblong, emarginate, with a tomentose disc, below which is an oblong tuft of short yellow hairs; spur beak-like.

Dendrobium luteolum, Batem. in Gard. Chron. 1864, p. 269. *Bot. Mag.* t. 5441.



Dendrobium luteolum.

One of the numerous discoveries of the Rev. C. Parish, on the banks of the Attacan river, in Moulmein, and sent by him to Messrs. Low and Co., in 1863, in whose nursery it flowered in the spring of the following year. The specific name, *luteolum*, "pale yellow," refers to the colour of the flowers, which usually appear in March or April. A sub-variety called *chlorocentrum** has greenish hairs on the lip.

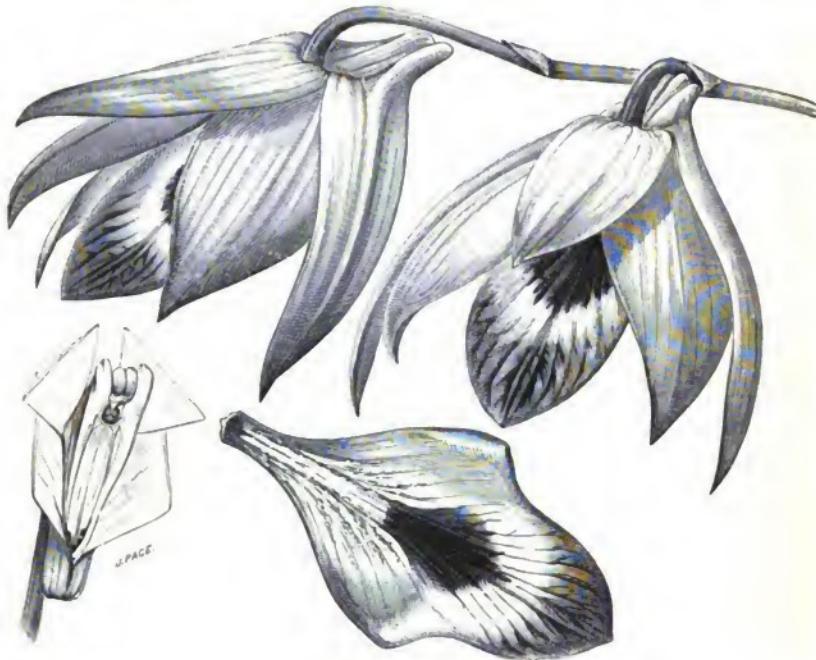
D. MacCarthiæ.

EUDENDROBIUM—*Fasciculata*. Stems 18—24 inches long, sub-pendulous, greyish white, with slightly swollen blackish joints. Leaves few, confined to the upper part of the stems, linear-lanceolate, 3—4 inches long, acute. Flowers somewhat flattened, but when spread out 4 inches

* Rehb. in Gard. Chron. XIX. (1883), p. 340. Williams' *Orch. Alb.* VII. t. 322.

across, in pendulous racemes of twos and threes from the uppermost joints; sepals and petals pale rosy mauve suffused with white, the former lanceolate-acute, the latter broader, ovate-oblong, sometimes striped along the middle with amethyst-purple; lip sub-rhomboid, convolute at the base, delicate mauve-purple, striped with deep purple, and with a maroon-purple disc surrounded by a white zone; spur nearly as long as the pedicel, obtuse, whitish. Column short, white above, purplish beneath.

Dendrobium MacCarthie, Thwaites, *Bot. Mag.* t. 4886 (1855). *Gard. Chron.* 1856, p. 692. Thwaites, *Plant. zeyl.* p. 297.



Dendrobium MacCarthie.

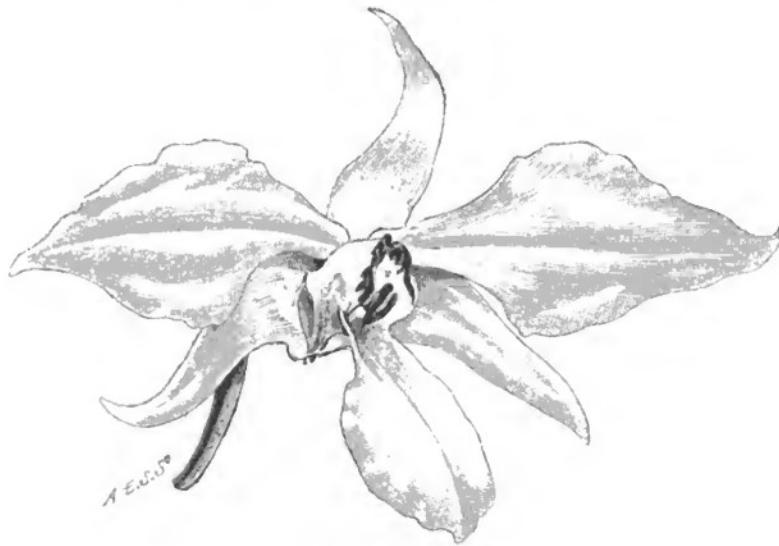
Communicated to the Royal Gardens at Kew, in 1855, by Dr. Thwaites, Director of the Botanic Garden at Peradeniya, in Ceylon, who had discovered it growing on the trunks of trees in the forests about Ratuapoora, and towards Point de Galle, in the southern parts of the island. Dr. Trimen, the present Director of the Botanic Garden at Peradeniya, informs us that this orchid is getting very scarce, and will soon become extinct; it never seems to become established, and he believes its life to be naturally shorter than

that of most species of *Dendrobium*. In the forests of Ceylon it is known to the natives by a name meaning "May flower," although in British collections it usually flowers from one to two months later. It was dedicated by its discoverer to Mrs. MacCarthy, the wife of the Hon. C. J. MacCarthy, who was Colonial Secretary of the island at the time of the discovery.

Cultural Note.—Although *Dendrobium MacCarthie* is a heat-loving plant, it grows but slowly under cultivation. It is sometimes so late as December before its latest formed stems are mature; it should then have a few weeks' rest by removal to a cooler and drier position, and no more water supplied than is sufficient to prevent its roots from shrivelling. (For climate of Ceylon, see page 9).

D. *Macfarlanei*.

STACHYOBIA—*Speciosa*. Stems erect, sub-cylindric, 5—8 inches high, usually di- rarely triphyllous. Leaves oblong, sub-acute, leathery, 3—4 or more inches long. Racemes ascending, 9—12 or more flowered.



Dendrobium Macfarlanei.
(From the *Gardening World*.)

Flowers among the largest in the genus, 4—5 inches across; sepals and petals white, the former lanceolate, the latter longer and broader, sub-rhomboidal, acuminate; lip nearly as long as the petals, three-

lobed, the side lobes basilar, oblong, white with a large purple spot at the anterior margin; intermediate lobe cuneate-oblong, acute, white, purple at the base, as is the ligulate furrowed callus. Column white, bordered with purple on each side of the stigmatic cavity.

Dendrobium Macfarlanei, Rchb. in *Gard. Chron.* XVIII. (1882), p. 520. *Id. XXVI.* (1886), p. 811.

A beautiful species sent to us, in 1882, from the Papuan Institute, in Torres Straits, by the Rev. S. M. Macfarlane, to whom it is dedicated by Professor Reichenbach. Its discoverer was the late Mr. Hartman, of Toowoomba, Queensland, to whom botany and horticulture are indebted for many plants gathered by him for the first time in North Australia, and in the south-east peninsula of New Guinea, the supposed habitat of this Dendrobie. Owing to the exhausted condition in which the few plants that survived the long journey reached us, none have yet flowered, but one derived from another source flowered in the autumn of 1886, in the collection of Mr. J. N. Hibbert, at Chalfont Park, near Slough, from which the accompanying woodcut was taken.

D. *macrophyllum* var. *Veitchianum*.

EUDENDROBIUM—*Culostachys*. A robust plant. Stems clavate, compressed, furrowed, attenuated below, 12—20 inches high. Leaves sub-terminal, 2—3 on each stem, oblong, 6—10 inches long, persistent 2—3 years. Racemes erect, many-flowered. Flowers 2 inches in diameter; sepals ovate-oblong, pale greenish yellow, hairy at the back, as is also the ovary; petals spatulate, smaller, whitish; lip three-lobed, lateral lobes rotund, ascending, greenish yellow streaked with purple; middle lobe transversely oblong, greenish yellow with radiating dotted purple lines.

Dendrobium macrophyllum Veitchianum, *Bot. Mag.* t. 5649 (1867). *D. Veitchianum*, Lindl. in *Bot. Reg.* 1847, sub. t. 25.

The plant described above was first sent to the Exeter Nursery, in 1846, by Thomas Lobb, who discovered it in the hottest jungles in the island of Java. The typical *Dendrobium macrophyllum*, of Achille Richard, which had been detected some years previously in Western New Guinea, and which appears to have never been introduced into Europe in a living state, is described as being “one of the finest orchids, having leaves upwards of a foot long, and a spike twice as long.”* The flowers are deep yellow and very hairy.

* *Bot. Mag.* sub. t. 5649.

D. mesochlorum.

EUDENDROBIUM—*Fasciculata*. Stems tufted, slender, 15—20 inches long. Leaves linear, acute, 4—5 inches long. Flowers $1\frac{1}{2}$ inches across, in fascicles of twos and threes on pale purplish pedicels; sepals and petals white more or less tinted with pale rose-purple towards the tip, the former linear-oblong, the latter oval-oblong; lip clawed, broadly oblong, rolled over the column into the form of a funnel, white with a few purple streaks near the base, and with a large yellow-green disc.

Dendrobium mesochlorum, Lindl, in Bot. Reg. 1847, sub. t. 36. Paxt. Fl. Gard. I. p. 63, icon. xyl. only.

First introduced by us from India, in 1847, through Thomas Lobb, and recently re-introduced to the Royal Gardens at Kew and other places.* The pleasant violet fragrance of its medium-sized flowers, which are produced in profusion in May, renders it a very desirable plant. The specific name, from $\muέσος$ (mesos), "middle," and $\chiλωρός$ (chloros), "green," refers to the greenish disc of the lip.

D. Moorei.

STACHYOBIA—*Speciosa*. A dwarf tufted plant. Stems terete, 4—6 inches long, with 3—5 oval-oblong, leathery leaves at their apex. Scapes filiform, bearing at their extremity a raceme of 6—10 pure white flowers. Sepals and petals linear-lanceolate; lip similar but shorter, and with a small triangular lobe on each side below the middle.

Dendrobium Moorei, F. Muell. Frag. Phytol. Austral. VII. p. 29 (1869—71). Benth. Fl. Austral. VI. p. 281. Rchb. in Gard. Chron. X. (1878), p. 139.

A small white-flowered species sent to us, in 1878, by Mr. Charles Moore, Director of the Botanic Garden at Sydney, New South Wales, to whom it is dedicated. It is a native of Lord Howe's Island, where it was discovered, in 1869, by Mr. Fitzgerald, author of a fine illustrated work on Australian orchids, growing "on precipices, among the mountains, and on the mossy branches of trees which hang over the cliffs."

D. moschatum.

EUDENDROBIUM—*Calostachys*. Stems cylindric, erect, 4—6 feet high, leafy throughout. Leaves oblong-lanceolate, leathery, 4 inches long, persistent two years. Racemes from the uppermost joints of the previous year's shoots, 7—15 flowered. Flowers 3—4 inches in diameter, with a faint musk fragrance; sepals oval-oblong, pale nankeen-yellow, veined

* We regret that the above meagre information respecting the habitat of *Dendrobium mesochlorum* is all we can give, the records of Lobb's orchid collections having, unfortunately, been lost many years ago.

and reticulated, the distal half tinted with pale rose; petals oval, much broader than the sepals but similarly coloured; lip calceolate, the anterior part very hairy both within and without, and having five fringed lines in front of the disc, on which are two large purple-maroon blotches surrounded with orange, the remainder pale nankeen-yellow; spur short, obtuse.

Dendrobium moschatum, Wallich. Fl. Nep. p. 34. Lindl. Gen. et Sp. Orch. p. 82 (1831). Paxt. Mag. Bot. II. p. 241 (1836). Bot. Mag. t. 3837 (1841). Hook. Cent. Orch. t. 13. D. cupreum, Bot. Reg. t. 1779 (1835).

var.—*Calceolaria*.

Flowers somewhat smaller, bright orange-yellow, the sepals and petals with deeper coloured veins and reticulation, the lip also deeper with two maroon spots near the base.

D. moschatum *Calceolaria*, supra. D. *Calceolaria* Carey, Hook. Exot. Fl. III. t. 184. De Puydt, Les Orch. t. 15. D. *moschatum cupreum*, Williams' Orch. Alb. IV. t. 165. D. *Calceolus*, Hort.

Native of the plains of Lower Burmah and Moulmein, where it is very common. It first became known in British gardens about the year 1825, through its discoverer, Dr. Wallich, who sent it to Dean Herbert. The variety, which is found further north, was introduced many years afterwards, and was at first considered specifically distinct. The flowers of *Dendrobium moschatum* are among the largest in the genus, but they are of short duration, lasting in perfection scarcely a week.

D. *mutable*.

STACHYOBIA—Speciosa. Stems slender, attenuated at the base and apex, 8—12 or more inches long, leafy throughout. Leaves sessile, elliptic-oblong, obtuse, gradually smaller upwards. Racemes ten or more flowered. Flowers crowded, 1 inch in diameter, white tinted with rose; sepals ovate-oblong, obtuse; petals broader, sub-rotund, wavy; lip broadly obovate, three-lobed, "with a deep notch at the apex, and a raised yellow crest of three ridges on the disc near the base"; spur short, obtuse.

Dendrobium mutable, Lindl. Gen. et Sp. Orch. p. 86 (1831). D. *triadenium*, Lindl. Bot. Reg. 1846, sub. t. 64. Id. 1847, t. 1. Bot. Mag. t. 5285. *Onychium mutable*, Blume, Bijdr. p. 324.

Discovered by the Dutch botanist Blume on the mountains of Java, in the early part of the present century. The earliest notice of it as a horticultural plant occurs in 1846, when it was in cultivation in Mr. Rucker's collection at West Hill, Wandsworth, and in the nursery of Messrs. Rolisson at Tooting, who had introduced it. It is best known in British gardens under the name of *Dendrobium triadenium*.

D. nobile.

Stems tufted, sub-terete, compressed, jointed, 12–20 or more inches long. Leaves ovate-lanceolate, 3–4 inches long, obliquely emarginate, persistent two years. Flowers somewhat variable in colour, with a lustrous wax-like surface, 2½–3 inches across, in fascicles of twos and threes; sepals ligulate; petals oval-oblong, wavy, the basal area of both sepals and petals usually white, the apical area deeper or paler amethyst-purple, the colour sometimes confined to the tips, sometimes extending more than half-way down; lip with a convolute claw and obovate-oblong blade, downy both above and below, and having a rich maroon-purple disc, surrounded by a yellowish white zone, and an amethyst-purple blotch at the apex.

Dendrobium nobile, Lindl. Gen. et Sp. Orch. p. 79 (1831). Id. *Sert. Orch.* t. 3 (1838). *Paxt. Mag. Bot.* VIII. p. 7 (1840).



Dendrobium nobile.

var.—cærulescens.

Stems shorter and more slender. Flowers smaller and more deeply coloured, the lip with a more oval blade.

D. nobile cærulescens, Rchb. in Walp. Ann. VI. p. 283. *D. cærulescens*, Lindl. *Sert. Orch.* t. 18.

var.—Cooksonianum.

A curious sport in which the petals have a tendency to become metamorphosed into lips, being concave, erect, and parallel with the column like the true labellum, and with a large maroon blotch on the basal half.

D. nobile Cooksonianum, Rchb. in Gard. Chron. XXIII (1885), p. 692.

var.—elegans.

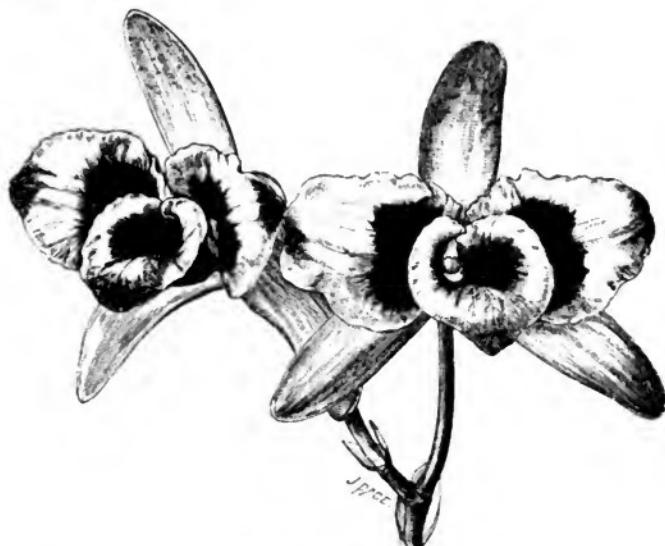
Flowers larger and more symmetrically shaped than in the ordinary forms; petals broader and white at the base; the zone surrounding the maroon disc of the lip pale sulphur-yellow, apical margin rose-purple.

D. nobile elegans, Hort.

var.—nobilis.

Flowers larger and more richly coloured than in any of the varieties of *Dendrobium nobile*, deep amethyst-purple; sepals and petals paler at the base; the maroon disc on the lip surrounded by a milk-white zone.

D. nobile nobilis, Rehb. in Gard. Chron. XVII. (1882), p. 366. Williams' Crch. Alb. V. t. 214.



Dendrobium nobile Cooksonianum.

var.—Schroederianum.

Flowers larger with broader segments; sepals and petals white, sometimes with a pale amethyst-purple apical blotch; disc of lip rich maroon-purple, almost black, bordered with pale yellow that passes to white at the margin.

D. nobile Schroederianum, supra.

var.—Tollianum.

A monstrous form in which the pedicels of the flowers are twisted, the flowers then appearing inverted, and at the same time never fully expanding, the outer whorl of segments being appressed to the inner whorl, the segments of the inner whorl reflexed at the apex.

D. nobile Tollianum, Rehb. in Gard. Chron. XXI. (1884), p. 445.

Other forms have received the names of *albiflorum*, *Collianum*, *intermedium*, *formosanum*, *pulcherrimum*, *Measuresianum*, *Schneiderianum*, *Tautzianum*, etc., either in reference to the colour or form of the flowers, or in compliment to the gentlemen in whose collections they have appeared.

Familiar as is this grand old Dendrobie, its geographical distribution is but very vaguely known, and its botanical history, too, is often obscure; all that can be affirmed with certainty is, that it is spread over north and north-east India* and southern China, but, except within the British territory, its limits have not yet been ascertained. It first became known to horticulture—and probably to science—in the early part of the present century, from a Chinese drawing in the library of the Horticultural Society of London.† The first living plant seen in England was brought from China by the late Mr. John Russell Reeves, to whom British horticulture is indebted for many useful introductions, and who had purchased it in the market at Macao; this plant was presented to Messrs. Loddiges, in whose nursery it flowered in 1837.‡ The variety *cærulescens* was gathered by Gibson on the northern slopes of the Khasia Hills, at about 4,000 feet elevation, and was sent by him to Chatsworth, in 1837.§ *Cooksonianum* is a remarkable case of *trilabella*, that was first observed in the collection of Mr. Theodore Lange, at Heathfield House, Gateshead; the plants raised from this sport subsequently passed into the hands of Mr. Norman C. Cookson, of Wylam-on-Tyne, by whom they were first publicly exhibited; curiously enough, a sport identical with this occurred a little later in one of the glass houses belonging to the Misses Arkwright, at Mark Hall, Harlow, and a third case has since been reported from the gardens of Mr. J. B. Mirrlees, at Redlands, Glasgow.¶ The other varieties have appeared among recent importations; *elegans* is in the collection of Sir T. Lawrence, at Burford Lodge, and in a few other places; *nobilis* was originally purchased by Mr. James, of the Castle Nursery, Lower Norwood, at one of the sales at Stevens' Rooms, the plant being afterwards acquired by Messrs. Rollisson, who exhibited it in flower at the Ghent Quinquennial Exhibition in 1878; but it suffered

* It was detected by Sir J. D. Hooker covering oak trees at Chakoong.—Him. Journ. II. p. 19.

† Lindl. Sert. Orch. sub. t. 3.

‡ Idem.

§ Idem. sub. t. 18.

¶ The finest specimen of this remarkable variety we have yet seen, was exhibited by Mr. Perkins, gardener to the Right Hon. W. H. Smith, Greenlands, Henley-on-Thames, at the Meeting of the Royal Horticultural Society, at South Kensington, on March 13th, 1888. This plant bore 121 flowers.

so severely during transmission that it was with difficulty preserved alive; it shortly afterwards again passed into the hands of Mr. James, who succeeded in raising six plants from the old pseudo-bulbs.* *Schroederianum*, in compliment to Baron Schroeder, of The Dell, near Staines, in whose collection it is now in cultivation, is one of the loveliest forms of *Dendrobium nobile*; the maroon blotch on the lip is the deepest yet seen among its varieties, and affords a striking contrast to the pure white of the other segments. *Tollianum* was also a waif "picked up" at one of Stevens' sales by the late Mr. Toll, of Stretford Road, Manchester. The many excellent qualities of *D. nobile* as a garden plant are too well known to need enumeration by us, but among them we may mention its great potency as a hybridising agent, probably destined to produce even more striking results than those already obtained. The profusion in which its flowers are produced render it one of the finest of decorative plants when in full bloom, as the accompanying woodcut amply testifies. The grand specimen in the collection of the late Mr. Rucker, at West Hill, Wandsworth, which bore over one thousand expanded flowers at one time, is still fresh in the recollection of many horticulturists. The varieties *elegans*, *nobilis*, and *Schroederianum* are now recognised as amongst the most superb of Dendrobiums; *Cooksonianum* and *Tollianum* are among the most remarkable of sports. The normal flowering season of *D. nobile* and its varieties is from January to March, but it is often prolonged by regulating the cultural treatment, as to temperature, supply of water, etc.

D. ochreatum.

EUDENDROBIUM—*Fasciculata*. Stems stoutish, cylindric, with swollen joints, curved, decumbent, 6—9 inches long. Leaves ovate-lanceolate, acute, 2—3 inches long, deciduous. Flowers produced from the young leafy stems, generally in pairs, large and showy, 2—3 inches across, of a rich golden yellow, with a deep maroon-purple blotch on the lip; sepals and petals uniform, elliptic-oblong; lip with a convolute claw and orbicular concave blade, apiculate, downy above.

Dendrobium ochreatum, Lindl. Bot. Reg. sub. t. 1756 (1835). Rehb. Walp. Ann. VI. p. 287. D. Cambridgeanum, Paxt. Mag. Bot. VI. t. 265 (1839). Bot. Mag. t. 4450.

Discovered by Wallich in the early part of the present century, in the Chittagong district, India, but not introduced till 1837, when Gibson brought plants to Chatsworth, which flowered in the spring

* Gard. Chron. XVII. (1882), p. 433.



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(From the

of the following year; these plants were collected on the Khasia Hills, at an elevation of near 4,000 feet, where they were found attached to trees and to rocks.

Dendrobium ochreatum, better known in gardens under the name of *D. Cambridgeanum*, is one of the few Dendrobes of the *Fasciculata* group that produces its flowers from the young growths before they are fully matured, and while the leaves are still fresh; they usually appear in March and April.

Cultural Note.—As one of the most showy and beautiful of the yellow-flowered Dendrobes, and being of manageable size, *D. ochreatum* has received assiduous attention from cultivators. A remarkable instance of successful cultivation was brought under our notice not long ago, at Ashton Court, near Bristol, where a plant bore upwards of 180 flowers in one season. This plant is taken into a cool viney after it has completed its growths, and kept there during the summer months till the new shoots begin to push, when it is taken back to the East-India house. The plant had not been removed from the basket in which it was growing for several years, but had received an annual top-dressing of sphagnum, peat and charcoal. It has been observed of *D. ochreatum*, that if the young shoots are very vigorous they fail to produce flowers, a circumstance that may be due to more causes than one, as hypertrophy, immaturity of stem at the season of flowering, etc.

D. *Palpebræ*.

EUDENDROBIUM—Calostachys. Stems clavate, four-angled, attenuated below, 7—9 inches long, with 3—5 oblong-lanceolate, acute leaves at their summit. Racemes loose, 6—10 flowered, produced from the joints immediately below the leaves. Flowers with a faint hawthorn fragrance, French white with an orange-yellow disc near the base of the lip; sepals oblong; petals oval, broader than the sepals; lip oblong, with a short convolute claw, downy above and with a fringe of long hairs near the base; column yellowish.

Dendrobium Palpebræ, Lindl, in Jour. of Linn. Soc. V. p. 33 (1849). Paxt. Fl. Gard. I. p. 48 (1850—51).

Introduced by us, in 1849, from Moulmein, through Thomas Lobb. Its nearest affinity is *Dendrobium densiflorum*, from which, however, it is thoroughly distinct, especially in its more lax racemes of smaller white flowers, which usually appear late in the summer. The specific name, *Palpebræ*, "eyelids," refers to the fringe of long hairs like eyelashes near the base of the lip. It is found sparingly throughout Burmah, varying in colour from white to dark rose. The finest and most floriferous varieties come from the Karen Hills.*

* Major-General E. S. Berkeley, MS.

D. Parishii.

EUDENDROBIUM—*Fasciculata*. Stems thickish, a foot or more long, curved, decumbent. Leaves oblong-lanceolate, acute, 3–5 inches long, deciduous. Flowers solitary or in fascicles of twos and threes, produced on the leafless stems along more than the distal half of their length; sepals oblong-lanceolate, rosy amethyst-purple; petals oval-oblong, similarly coloured; lip orbicular, downy above, amethyst-purple, with a maroon blotch on each side, below which are some purple markings. Column white, except the anther case, which is purple.

Dendrobium Parishii, Rchb. in Bot. Zeit. 1863, p. 237. Bot. Mag. t. 5488. Xen. Orch. II. p. 140, t. 152. Jennings' Orch. t. 39.

Sent from Moulmein in 1863, by the Rev. C. Parish, after whom it is named, to Messrs. Low and Co. Its flowers are almost as handsome as those of *Dendrobium nobile*, but its ugly crooked stems are not likely to be mistaken for the more elegant upright ones of its congener. It usually flowers in June and July.

D. Phalaenopsis.

STACHYOBIA—*Speciosa*. Stems 15—21 inches long, nearly as thick as the little finger. Leaves lanceolate-acuminate, 5—7 inches long, confined to the upper part of the stems. Peduncles terminal or



Dendrobium Phalaenopsis.
(From the *Gardeners' Chronicle*.)

pseudo-terminal, slender, nearly as long as the stems, racemose along the apical half, 10—15 flowered. Flowers 2½—3½ inches across, on slender pedicels, at the base of which is a minute scaly bract; sepals

lanceolate acute, white flushed with pale rosy mauve; petals much broader, rhomboid-orbicular, purplish mauve, with deeper veins and paler centre; lip three-lobed, the side lobes rotund, curved upwards over the column, maroon-purple, sometimes paler towards the margin; middle lobe oblong, apiculate, maroon-purple at the base, the free portion pale purple with deeper veins; spur broad, compressed laterally, gibbous below. Column triquetral, white stained with purple.

Dendrobium Phalaenopsis, Fitzgerald in *Gard. Chron.* XIV. (1880), p. 38. Id. *Austral. Orch. I.* part 6. Williams' *Orch. Alb.* IV. t. 187. *Bot. Mag.* t. 6817.

This is a recent addition to the genus, but by whom it was discovered we do not find recorded. Mr. Fitzgerald, in his notice of this Dendrobie published in the *Gardeners' Chronicle*, loc cit, states that it was introduced into cultivation by Captain Broomfield, of Balmain, who procured it from North Australia and New Guinea; it has also been detected in Timor-Laut, a small island nearly equidistant from the north coast of Australia and the south-west coast of New Guinea. *Dendrobium Phalaenopsis* is unquestionably the finest of the *Speciosae* sub-section yet known, its nearest allies being *D. superbiens*, *D. bigibbum*, and *D. Macfarlanoi*, the last-named being scarcely inferior to it in the size and beauty of its flowers. It received its specific name from a fancied resemblance of its flowers to those of the Moth Orchids (*Phalaenopsis*).

D. Pierardi.

EUDENDROBIUM—Fasciculata. Stems slender, pendulous, 2—3 feet long. Leaves ovate-lanceolate, the lowermost 4—5 inches long, gradually smaller upwards, deciduous. Flowers 1—2 inches across, usually in pairs, produced along the upper two-thirds of the leafless stems; sepals and petals semi-transparent, pale rosy mauve, the former linear-lanceolate, the latter elliptic-oblong, acute; lip broadly deltoid, obscurely three-lobed, pale primrose-yellow, streaked with purple at the base, downy above; spur short, obtuse. Column white.

Dendrobium Pierardi, Roxb. MS. (prior to 1814), Lindl. Gen. et Sp. Orch. p. 79 (1831). *Bot. Mag.* t. 2584 (1825). *Bot. Reg.* t. 1756. Van Houtte's *Fl. des Serres*, VIII. t. 955, var. *latifolium*. *D. cucullatum*, R. Br. in *Bot. Reg.* t. 548 (1821). *Bot. Mag.* t. 2242. Rchb. Walp. Ann. VI. p. 284.

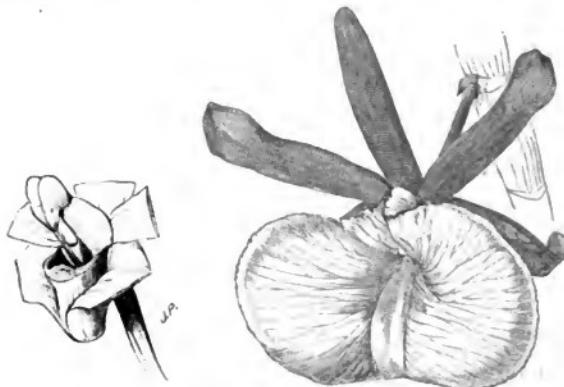
This is one of the commonest of the Dendrobes inhabiting the countries bordering the north and north-east of the Bay of Bengal, where it has an extensive range from north-east India, southwards to the plains and hills of British Burmah. It is particularly abundant in the Mangrove swamps of the Sunderbunds, and scarcely less so at its southern limit in Moulmein;* it also

* Colonel Benson, in *Gard. Chron.* 1870, p. 796.

clothes the trunks of the fallen trees in the hot valleys of the lower Sikkim Himalayas.* Over so extensive a range the flowers are found to vary considerably in size and somewhat in form, the sepals and petals being more pointed, and the lip broader in some forms than in others. *Dendrobium Pierardi* is horticulturally interesting as being one of the first, if not *the* first Indian Dendrobium introduced into the glass structures of Europe; it was sent to the Royal Gardens at Kew, by Dr. Roxburgh, in the early part of the present century; it is also known to have flowered in the Botanic Garden, at Liverpool, in 1821; also in Lady Banks' collection, at Spring Grove, in the same year. It is named after Pierard, by whom it was introduced to the Botanic Garden at Calcutta, in the first decade of the present century.

D. primulinum.

EUDENDROBIUM—*Fasciculata*. Stems terete, erect or sub-erect, but sometimes decumbent, 12–18 inches long, nearly as thick as the little finger. Leaves lanceolate, 4 inches long, gradually smaller upwards, obliquely emarginate, deciduous. Flowers solitary or in pairs, 2–3



Dendrobium primulinum.

inches across; sepals and petals similar and sub-equal, oblong-obtuse, pale mauve-lilac; lip sub-orbicular, with a convolute claw, which gives the blade the form of a broad-mouthed funnel, pale primrose-yellow with some purple streaks at the base.

Dendrobium primulinum, Lindl. in Gard. Chron. 1858, p. 400. Regel's *Gartenfl.* 1861, t. 326. Williams' *Orch. Alb.* VI. t. 286. *D. nobile pallidiflorum*, *Bot. Mag.* t. 5003.

* Sir J. D. Hooker, *Him. Jour.* I. p. 103.

var.—giganteum.

Stems longer and more slender, pendulous. Flowers nearly as large again as those of the normal form, the lip alone being 2 inches across, that organ sometimes veined with pale rose.

D. primulinum giganteum, Hort.

Very nearly allied to *Dendrobium Pierardi*, from which it is chiefly distinguished by its shorter and stouter stems, its nearly equal sepals and petals, and its differently shaped lip. It is a native of the lower Himalayan zone in Nepaul and Sikkim. The variety *giganteum* is a very distinct form, remarkable for the enormous development of the labellum as well as for the other characters noted above; other large-flowered forms of *D. primulinum* have been improperly called *giganteum* that do not conform to the type described above. The specific name refers to the cowslip fragrance of the flowers, which expand in February and March. It appears to have been introduced about the year 1857.

D. rhodopterygium.

EUDENDROBIUM—*Fasciculata*. Stems cylindric, erect, 12—20 inches high. Leaves linear-lanceolate, 2—3 inches long. Flowers 2½ inches across; sepals oblong-lanceolate; petals ovate-oblong, both sepals and petals rosy purple mottled with white; lip sub-orbicular when spread out, margin denticulate, deep purple-crimson striated, bordered with white, and with a pale central band reaching to the base.

Dendrobium rhodopterygium, Rehb. in *Gard. Chron.* III. (1875), p. 684. *D. polyphlebium*, Rehb. *Id. I. s. 3* (1887), p. 702. *Williams' Orch. Abb.* VII. t. 299.

An attractive species discovered by Boxall, in 1874, in the Moulmein district of British Burmah, and sent by him to Messrs. Low and Co. It was subsequently found by Major-General E. S. Berkeley, "on four different occasions," in Burmah, and again described by Reichenbach, from one of the plants sent home by him, hesitatingly, as a supposed natural hybrid between *Dendrobium Pierardi* and *D. rhodopterygium*, under the name of *D. polyphlebium*. The plants that have come into our possession under this name show, however, no tangible difference from those of *D. rhodopterygium*, and we are, therefore, compelled to regard *D. polyphlebium* as a synonym only of *D. rhodopterygium*.

D. Ruckeri.

EUDENDROBIUM—*Fasciculata*. Stems slender, 12—18 inches long, attenuated below. Leaves linear-lanceolate, acute, 2½ inches long.

Flowers $1\frac{1}{2}$ inches in diameter, solitary or in pairs from the uppermost joints; dorsal sepal oblong, obtuse; lateral sepals triangular, subacute; petals like the dorsal sepal but narrower; both sepals and petals pale fawn-yellow; lip sub-orbicular, three-lobed, the lateral lobes turned upward towards the column, white streaked with rose; the middle lobe reflexed with undulate margin, and with a pubescent ridge down the middle, fawn-yellow, paler towards the base.

Dendrobium Ruckeri, Lindl. in *Bot. Reg.* 1843, t. 60.

This is a native of the Philippine Islands, said to have been discovered by Cuming, and sent by him to Messrs. Loddiges in 1842. It is named after the late Mr. Sigismund Rucker, in whose collection at West Hill, Wandsworth, it flowered for the first time in this country soon after its introduction.

D. sanguinolentum.

EUDENDROBIUM—Fasciculata. Stems pendulous, cylindric, as thick as an ordinary writing-pencil, 2—3 feet long, leafy throughout. Leaves elliptic-oblong, 3 inches long, persistent two or more years. Flowers 1 inch in diameter in racemes of 3—5 from the uppermost joints; sepals oval-oblong, pale amber-yellow with a small purple blotch at the apex; petals obovate, obtuse, the basilar portion pale amber-yellow, the apical portion purple; lip with a convolute claw, three-lobed, pale amber-yellow striated with red on the disc, and with a purple blotch at the apex, the side lobes rotund, the middle one emarginate; spur broad, obtuse.

Dendrobium sanguinolentum, Lindl. in *Bot. Reg.* 1842, misc. 72. *Id.* 1843, t. 6. *Gard. Chron.* 1843, p. 118.

Sent from Ceylon, by Mr. Nightingale, to the Duke of Northumberland, in whose gardens at Syon House it flowered in 1842. It is now seldom seen in the orchid collections of Great Britain.

D. scabringue.

EUDENDROBIUM—Formosae. Stems erect, stoutish, slightly attenuated below, 9—12 inches high. Leaves oblong, obliquely two-lobed at the apex. Flowers about $1\frac{1}{2}$ inches in diameter, in fascicles of twos and threes from the uppermost joints; sepals and petals similar and sub-equal, ovate-lanceolate, ivory-white; lip three-lobed, the side lobes oblong, erect, yellow-green; the middle lobe oval-oblong, reflexed, yellow with 5—7 orange-yellow sunk lines on the disc; spur small, conical.

Dendrobium scabringue, Lindl. in *Jour. Linn. Soc.* III. p. 15 (1858). *D. hedyosmum*, Batem. in *Bot. Mag.* t. 5515 (1865). *D. albo-viride*, Parish, MS.

Discovered in 1849 in Moulmein, by Thomas Lobb, from whose dried specimens it was described by Dr. Lindley, in the *Journal*

of the Linnean Society, in the volume above quoted. It was not introduced till 1862, in which year it was sent to Messrs. Low and Co., by the Rev. C. Parish, under the name of *Dendrobium albo-viride*, in reference to the greenish white tint of the flowers when first expanded; but as the flowers lose the green tint in the course of a few days, the name was changed by Mr. Bateman in the *Botanical Magazine* to *hedyosmum*, "sweet-scented," in reference to their pleasant Wallflower fragrance, overlooking the fact that the species had been previously named *scabringue*, "rough-lipped," by Dr. Lindley. It usually flowers in March and April.

D. secundum.

EUDENDROBIUM—Pycnostachyaæ. Stems terete, 15—21 inches long, somewhat thicker than an ordinary writing pencil. Leaves ovate-oblong, 3—4 inches long and 2 inches broad, deciduous. Racemes lateral, 3—4 inches long, produced from the uppermost joints of the leafless stems. Flowers crowded, all turned towards the same side, rosy purple; sepals ovate, narrow; petals similar, but smaller; lip obovate-spathulate, paler in colour than the other segments, and with an orange blotch at the apex; spur long, obtuse.

Dendrobium secundum, Wallich. Lindl. in *Bot. Reg.* t. 1291 (1829). *Bot. Mag.* t. 4352. *Pedilonum secundum*, Blume, *Bijdr.* p. 322.

var.—niveum.

Stems shorter than in the common form. Flowers white except the orange tip of the lip.

D. secundum niveum, Rchb. in *Gard. Chron.* XVII. (1882), p. 733.

The only claims this Dendrobie has to a notice in this place are its very distinct racemes of rose-coloured flowers, and its being the typical species of an important sub-section of the genus (*Pycnostachyaæ*). It was introduced from Sumatra by Mr. W. Mac-Killigin, and flowered in Mr. Tate's nursery at Sloane Square, London, in 1829, it having been previously discovered by Blume in Java, and by Dr. Wallich in one of the islands in the Straits of Malacca. It has also been reported from North Borneo (abundant), and other islands of the Sundaic group, from Lower Burmah, the Malay peninsula, Cochin China, and other places; it is thence one of the most widely distributed of Dendrobes. The white-flowered variety was introduced by Messrs. Maule and Sons, of Bristol. *Dendrobium secundum* flowers in the autumn and winter months. The specific name refers to the one-sided arrangement of the flowers on the rachis, which, in the language of botany, are said to be *secund*.

D. *senile*.

EUDENDROBIUM—*Fasciculata*. Stems fusiform, 2—3 inches long, clothed with long woolly hairs, and bearing at their extremity 2—3 obovate-lanceolate leaves, $1\frac{1}{2}$ — $2\frac{1}{2}$ inches long, similarly clothed. Flowers solitary or in pairs, produced from the side of the stem near the apex, pale buttercup-yellow, the lip deeper and brighter in colour; sepals ligulate, acute; petals oval-oblong; lip ovate-oblong, obscurely three-lobed.

Dendrobium senile, Rehb. in Gard. Chron. 1865, p. 434. Id. *Xen. Orch. II.* p. 143, t. 155. *Bot. Mag.* t. 5520.

Discovered by the Rev. C. Parish in Moulmein, and sent by him to Messrs. Low and Co., in 1864. The plant is singular among Dendrobiums from its being clothed with long woolly hairs like some of the *Cerens*, and which suggested its specific name (*senilis*, literally, “resembling old age”). The flowers are nearly as large as those of *Dendrobium chrysanthum*, and are produced in the spring months. It is best cultivated on blocks suspended near the roof glass.

D. *speciosum*.

STACHYOBIDIUM—*Speciosae*. A robust plant. Stems clavate, 9—12 inches long and $1\frac{1}{2}$ inches thick, bearing at their apex 3—4 coriaceous elliptic-oblong leaves 8—10 inches long, and $2\frac{1}{2}$ — $3\frac{1}{2}$ inches broad. Peduncles two or more from each stem, pseudo-terminal, 20—30 inches long, marked with longitudinal ridges and furrows, and bearing a somewhat dense raceme of pale buff-yellow fragrant flowers. Flowers small, never fully expanding; sepals lanceolate, acuminate, the lateral two falcate; petals linear-lanceolate; lip shorter than the other segments and almost enclosed by them, oblong with the sides turned upwards, truncate at apex, and with a notch at each lateral margin, making it obscurely three-lobed, pale yellow spotted with purple. Column short, white, spotted with purple on side facing the lip.

Dendrobium speciosum, Smith Exot. Bot. I. p. 17. *Bot. Mag.* t. 3074 (1831). *Bot. Reg.* t. 1610 (1833). Benth. Fl. Austral. VI. p. 279.

var.—*Bancroftianum*.*

As distinguished from the type, the stems are more slender, the petals longer and narrower, the lip paler with a few purple spots at the base.

D. *speciosum Bancroftianum*, Rehb. in Gard. Chron. XV. (1881), p. 782.

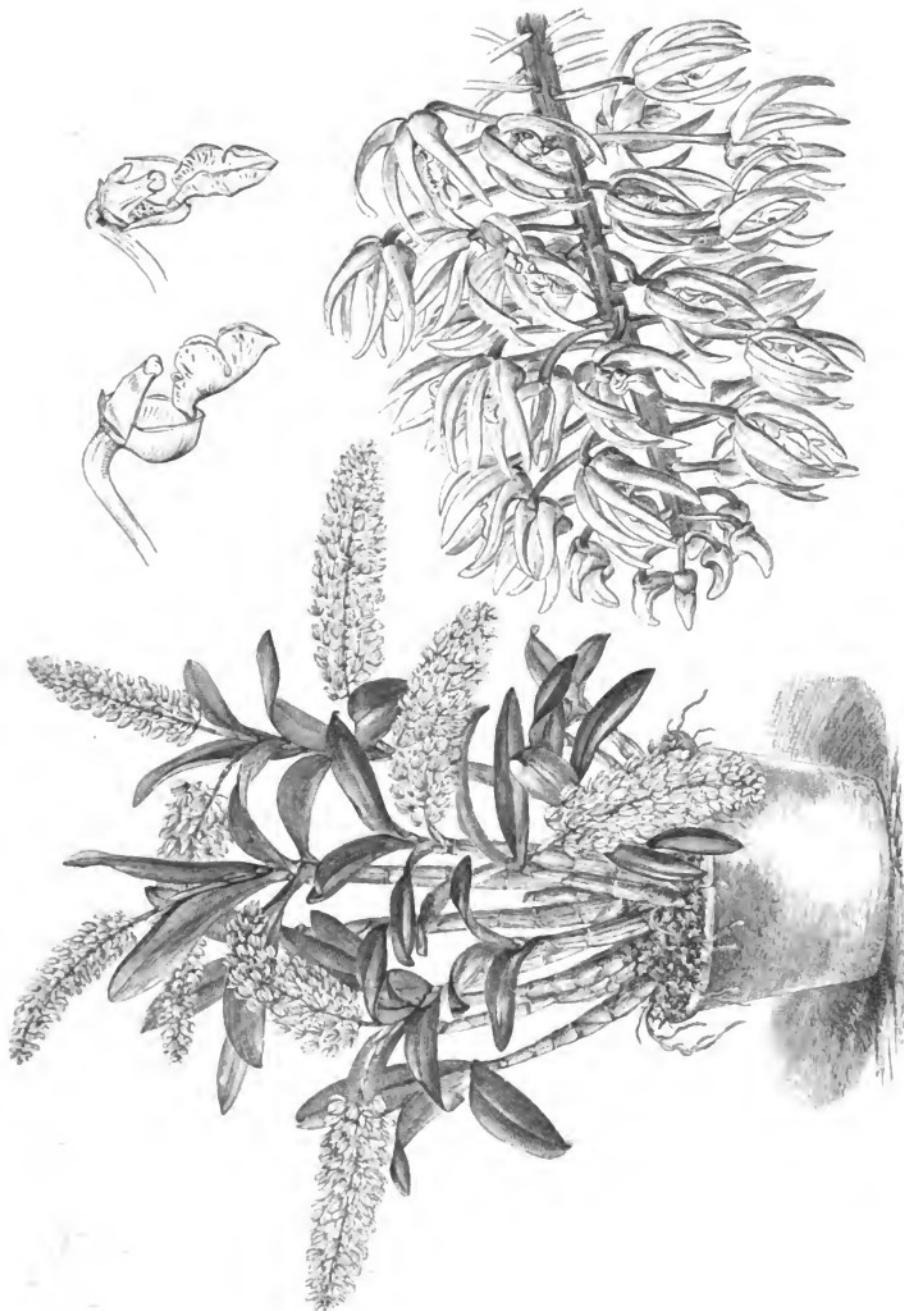
var.—*Hillii*.

Stems and leaves longer than in the type; racemes longer and more dense; sepals longer and narrower, petals linear; flowers cream-white with some purple spots on the lip.

D. *speciosum Hillii*, Gard. Chron. VII. (1877), p. 112, with ic. xyl. D. *Hillii*, *Bot. Mag.* t. 5261. Williams' *Orch. Alb.* V. t. 198.

* Not seen by us.

Dendrobium speciosum, var. *Hillii*.
Drawn in Mr. R. F. Measles' collection, Canthie Lodge, Cumberwell.



A native of Australia, confined chiefly to the neighbourhood of the east coast, where it is frequent on the banks of streams from Port Bowen southwards to Cape Howe. It was one of the first Australian Dendrobiums introduced into British gardens, it having been sent to Kew in the spring of 1823, by Allan Cunningham. The variety *Bancroftianum* was sent from Brisbane, by Dr. Bancroft, in 1881, to Mr. Christy, of Fenchurch Street. The variety *Hillii* is also a Queensland form, found in the neighbourhood of Moreton Bay; it is dedicated to the late Mr. Walter Hill, superintendent of the Botanic Garden, Brisbane; it is an excellent horticultural subject, and when successfully cultivated forms a striking object while in flower; its racemes are the largest and most massive yet seen in the genus. *Dendrobium speciosum* and its varieties usually flower in February and March.

D. Stratiotes.

STACHYOBIUM—*Speciosae*. Stems fustiform or sub-cylindric, much attenuated upwards, 15—20 inches high, jointed, the nodes slightly depressed. Leaves very leathery, oblong-lanceolate, 4—5 inches long. Racemes 5—7 or more flowered. Flowers $2\frac{1}{2}$ —3 inches across from the tip of the dorsal sepal to the apex of the lip, on greenish white pedicels; sepals cream-white, narrowly lanceolate, acuminate, the dorsal one twisted, the lateral two falcate, undulate; petals linear, longer than the sepals, twisted, pale yellow-green; lip three-lobed, white streaked with purple; the side lobes rotund, erect; the middle lobe cordate, acuminate, depressed; spur funnel-shaped, slightly recurved.

Dendrobium Stratiotes, Rehb. in Gard. Chron. XXV. (1886), p. 286. Id. icon. cyl. XXVI. p. 177.

A distinct and beautiful species, discovered by the Lindenian collectors in the Sundaic Archipelago (presumably western New Guinea), and introduced by the Compagnie Continentale d'Horticulture in 1885. Its flowers, which appear in the autumn months, are very persistent, continuing in perfection for several weeks. The specific name is literally "soldier," and refers to the tufts of formal erect stems, a character by which the plant may be easily recognised.

D. Strebloceras.

STACHYOBIUM—*Speciosae*. Stems produced from a stout rhizome as thick as a man's finger, terete, attenuated upwards, 24—36 inches high, leafy along the upper third of their length. Leaves oblong-lanceolate, 6 inches long, leathery, curved. Racemes produced from the uppermost joints,

18 or more inches long, 8—12 or more flowered. Sepals narrowly ligulate, acute, twisted, pale green with five brown nerves; petals linear, $1\frac{1}{2}$ inches long, 3—4 times twisted, brown with pale green margins; lip pale yellow streaked with purple, three-lobed, with five raised lines extending from the base to the disc of the intermediate lobe, where they are confluent; side lobes rotund; middle lobe subcordate with undulate margin; spur conic, acute. Column winged, white.

Dendrobium Strebloceras, Rehb. in *Gard. Chron.* XXV. (1886), p. 266. Id. I. s. 3 (1887), p. 140.

A most curious Dendrobe, discovered by the Lindenian collectors about the same time, and probably in or near the same locality as the preceding species, to which it is nearly allied, and like it, flowering in the autumn, the flowers persisting several weeks. A sub-variety with whitish flowers, called *Rossianum* (*Gard. Chron.* III. s. 3 (1888), p. 72), has appeared among the introduced plants. Both the species and the sub-variety are in cultivation in the rich collection of Dendrobes at Burford Lodge. The specific name is literally "the crumpled horn." ($\sigma\tau\rho\beta\lambda\circ\varsigma$, "twisted," and $\kappa\acute{\epsilon}\rho\alpha\varsigma$, "a horn"), and was suggested by the long twisted petals.

D. *sulcatum*.

EUDENDROBIUM—*Calostachyæ*. Stems clavate, 7—10 inches long, compressed and deeply furrowed, attenuated below, and bearing at their summit 2—3 ovate-oblong, acute leaves, 3—4 inches long. Racemes short, 10—15 flowered. Flowers orange-yellow, crowded; sepals oval-oblong; petals broader, ovate; lip more richly coloured than the other segments, broadly ovate, rolled over the column at the base, where there are some reddish streaks.

Dendrobium sulcatum, Lindl. in *Bot. Reg.* 1838, t. 65. R. A. Rolfe, in *Gard. Chron.* I. n. s. (1887), p. 607 (*polyantha*). *Bot. Mag.* t. 6962.

One of the discoveries of Gibson, who sent it from the Khasia Hills to Chatsworth, in 1837, where it flowered for the first time in the spring of the following year. It is a less attractive species than the nearly allied *Dendrobium densiflorum*, from which it may be easily distinguished by its flattened furrowed stems, and shorter racemes of smaller flowers, which soon fade.

D. *superbiens*.

STACHYOBIA—*Speciosæ*. Stems cylindric, slightly attenuated above and below, 20—30 inches high,* leafy along the upper portion only. Leaves broadly lanceolate, 3—4 inches long. Peduncles pseudo-terminal, slender, nodding, dull green tinged with purple, racemose along the

* In a wild state the stems are said to be often 3—4 feet long and as thick as a man's thumb.

distal half. Flowers about 2 inches in diameter, rich crimson-purple, the sepals and petals generally paler at the base and bordered with white; sepals oblong-obtuse, reflexed, undulate; petals broader, obovate; lip shorter than the other segments, three-lobed; the lateral lobes rotund, erect, or incurved; the middle lobe oblong, reflexed, wavy; disc with three denticulate lamellae that are white at the edge; spur short, funnel-shaped. Column purple, anther white.

Dendrobium superbiens, Rchb. in *Gard. Chron.* VI. (1876), p. 516. Id. IX. (1878), p. 40. *Flor. Mag.* n. s. t. 294. Fitzgerald's *Orch. Austral.* II. part I. Sander's *Reichenbachia*, I. p. 87, t. 39. D. *Goldiei*, Rchb. in *Gard. Chron.* IX. (1878), t. 145. *The Garden*, XIV. (1878), t. 145.

One of the most striking of the Australian Dendrobes. It is a native of York Peninsula and some of the islands in Torres Straits, whence it was introduced by us, in 1876, through the late Sir William Macarthur, of Camden Park, near Sydney, New South Wales. The flowers, which are developed in the autumn months, vary considerably in size and colour.

D. *superbum*.

EUDENDROBIUM—Fasciculata. Stems terete, stoutish, pendent, 2½—4 feet long. Leaves oblong-lanceolate, acute, 5—6 inches long, deciduous. Flowers with a powerful odour of rhubarb, usually in pairs along the distal half of the stems, 3—4 inches in diameter, rich magenta-purple with the basal half of the lip deep sanguineous purple; sepals oblong-lanceolate, acute; petals ovate-oblong, nearly as broad again as the sepals; lip with a short, broad, convolute claw, and cordate, acuminate blade, of which the upper surface is pubescent and the margin denticulate.

Dendrobium superbum, Rchb. in *Walp. Ann.* VI. p. 282 (1861). Williams' *Orch. Alb.* I. t. 42. D. *macrophyllum*, Lindl. *Bot. Reg.* 1839, misc. 46. Id. *Sert. Orch.* t. 35. Hook. *Cent. Orch.* t. 12. Paxt. *Mag. Bot.* VIII. p. 97. Linden's *Pesc.* t. 40. Warner's *Sel. Orch.* I. t. 26 (*giganteum*). De Puydt, *Les Orch.* t. 17. D. *macranthum*, Hook. *Bot. Mag.* t. 3970. Van Houtte's *Fl. des Serres*, VIII. t. 757.

var.—*anossum*.

Stems much shorter than in the typical *Dendrobium superbum*; flowers more commonly solitary than in pairs, almost scentless, and with all the segments shorter, broader, and not undulate.

D. *superbum* *anossum*, Rchb. in *Walp. Ann.* loc. cit. supra. D. *macrophyllum* *anossum*, Lindl. *Bot. Reg.* 1845, misc. 41. D. *anossum*, Paxt. *Mag. Bot.* XV. p. 97 (1849). D. *macrophyllum* Dayanum, Hort.

sub-vars.—*Burke's* (*Gard. Chron.* XXI. (1884), p. 306), sepals and petals white, as is also the anterior lobe of the lip, the convolute basal part of which is pale purple; *Colonel Deare's*, flowers of the purest white, sepals and petals somewhat more acute than the type; *Hutton's* (*Gard. Chron.* 1869, p. 1206), stems somewhat slender; flowers white, except the basilar portion of lip which is deep purple.

This superb Dendrobie was one of the discoveries of Cuming, in the neighbourhood of Manila, during his travels in the Philippine Islands, 1836—40, when many splendid orchids became known for the first time to European amateurs. It was sent by him to Messrs. Loddiges, in whose nursery at Hackney it flowered in 1839, and was described in the *Botanical Register* of the same year under the name of *Dendrobium macrophyllum*, by Dr. Lindley, who overlooked the fact that the French botanist, Achille Richard, had described six years previously another species with large leaves under the same name. Richard's plant, which is said to have been brought from New Guinea, is unknown to horticulture; but a variety from Java, called by Sir J. D. Hooker *Veitchianum*, and described in these pages, is still in cultivation. The variety *anosmum* was also introduced by Cuming; one of its chief peculiarities is the almost entire absence of the rhubarb odour from the flowers, which suggested the name. *Burke's* variety, a very beautiful one, was introduced by us in 1883, through the collector whose name it bears; *Colonel Deare's* was brought to England by the gallant officer whose name it bears, and is one of the purest white Dendrobes in cultivation; *Hutton's* was sent to us, in 1869, from one of the islands of the Malay Archipelago; it has now become extremely rare.

D. taurinum.

STACHYOBIA—*Speciosæ.** Stems cylindric, erect, 3—4 feet high, as thick as a man's fore finger. Leaves ovate-oblong, sheathing at the base, emarginate. Racemes pseudo-terminal, 10—20 inches long, many-flowered. Flowers large; sepals ovate, obtuse, reflexed, cream-white tinged with green; petals linear, twisted, as long again as the sepals, reddish brown toned with purple; lip oblong, crisped at the apex, pale rose-purple, traversed by reddish brown raised lines along the centre; spur conical, large.

Dendrobium taurinum, Lindl. *Bot. Reg.* 1843, t. 28. *Paxt. Mag. Bot.* X. p. 217.
Van Houtte's *Fl. des Serres*; t. 1904.

This is also one of Cuming's discoveries in the Philippine Islands, and communicated by him to Messrs. Loddiges, in whose nursery it flowered for the first time in October, 1842. It was named *taurinum* from the fancied resemblance of the flowers to the face and horns

* The elongated narrow petals (often twisted) of *Dendrobium taurinum* and its immediate allies, including *D. Striatum* and *D. Strebloceras*, described *supra*, afford a very distinct sub-sectional character which might conveniently separate them from *Speciosæ*, under the name of *Antennata*, or *Ceratobium*, as suggested by Lindley, in *Jour. Linn. Soc.* III. p. 2.

of a bull. Although one of the most remarkable of Dendrobes it is now seldom seen in collections, owing chiefly to the difficulty in establishing newly imported plants, a circumstance probably due to the situation selected by this species in its native country; this is almost invariably on the Mangrove trees in the swamps skirting the sea-shore, and where, during severe storms, the plants are sometimes washed by the spray. In such places the stems of *Dendrobium taurinum* often attain a height of ten feet, and produce racemes two feet long.

D. teretifolium.

STRONGYLE. Stems slender, branched, clustered on a creeping rhizome that sends forth a dense plexus of thread-like roots, by which the plant is held firmly on the substance to which it is attached. Leaves terminal, terete, curved, but sometimes straight, 4—10 inches long. Flowers white, numerous, in loose dichotomous panicles; sepals linear-subulate; petals linear, narrower than the sepals; lip shorter than the other segments, lanceolate, acuminate, reflexed with crisped margin, and with three undulate raised lines on the disc.

Dendrobium teretifolium, R. Br. Prod. Fl. Nov. Holl. p. 333 (1810). Lindl. Gen. et Sp. Orch. p. 91. Bot. Mag. t. 4711. Benth. Fl. Austral. VI. p. 285.

A singular species, native of New South Wales and Queensland, that has been known to science since the beginning of the present century. Its first introduction to British gardens cannot be stated with certainty, but the presumption is very strong that it was received about the same time as *Dendrobium speciosum*, that is, in 1823. It was in cultivation in Messrs. Loddiges' Nursery in 1839,* and at Kew in 1852, whither it had been sent by Mr. Charles Moore, Director of the Botanic Garden at Sydney.† The individual flowers of *D. teretifolium* offer no especial attraction, but as they are produced in great profusion the entire inflorescence gives a pleasing impression.

D. tetragonum.

STACHTOBIA—*Speciosæ*. Stems pendulous, acutely four-angled, 8—15 or more inches long, attenuated downwards into a slender terete foot-stalk that is pseudo-bulbous at the base. Leaves in pairs at the summit of the stems, spreading, oblong or elliptic-lanceolate, from between which the few-flowered raceme is produced. Flowers of peculiar

* Lindl. in Bot. Reg. 1839.

† Bot. Mag. sub. t. 4711.

aspect, 3—4 inches across; dorsal sepal narrow-subulate, the lateral two lanceolate, much broader at the base than the dorsal one, yellow spotted with red; petals linear, shorter and narrower than the sepals, white streaked with red; lip broadly ovate, apiculate, obscurely three-lobed, with two white lamellæ between the side lobes that are reduced to slender keels on the front lobe, white with transverse red bars. Column yellowish.

Dendrobium tetragonum, A. Cunn. Lindl. in Bot. Reg. 1839, misc. 33. Benth. Fl. Austral. VI. p. 279. *Bot. Mag.* t. 5956.*

Discovered by Allan Cunningham, about the year 1820, in the dry shady woods around Moreton Bay, and subsequently detected by other explorers in the neighbourhood of Rockingham Bay, on the banks of the Hastings or Macleay River, and in other localities near the east coast of Australia. It is one of the most singular of Dendrobiums, that merits notice on account of its remarkable flowers and curious habit. The specific name, literally "four-angled," refers to the stems.

D. *thyrsiflorum*.

EUDENDROBIUM—*Calostachya*. Stems terete, erect, 15—24 inches high, bearing near their apex 5—8 oval-oblong, persistent leaves, 4—6 inches long and 2 inches broad. Racemes lateral, pendulous, 9—12 inches long, many-flowered. Flowers 1½—2 inches across, spirally arranged round the rachis; sepals and petals of semi-transparent texture, white, the former ovate-oblong, acute, the latter sub-orbicular with denticulate margin; lip downy with a convolute claw which causes the sub-orbicular, fimbriate blade to take the form of a wide-mouthed funnel, rich orange-yellow.

Dendrobium thyrsiflorum, *Illus. hort.* t. 207 (1875). Regel's *Gartenfl.* t. 1021. *Fl. Mag.* n. s. t. 449. *D. densiflorum*, var. *albo-luteum*, *Bot. Mag.* t. 5780. *The Garden*, XXX. (1886), t. 574.

var.—*Walkerianum*.

Stems longer; racemes longer and bearing larger flowers.

D. thyrsiflorum Walkerianum, Warner's *Sel. Orch.* III. t. 21.

It is more on horticultural than on scientific grounds that we give specific rank to this beautiful Dendrobium, as the characters which distinguish it from *Dendrobium densiflorum*, to which it has been referred by Sir J. D. Hooker, are not usually considered by good authorities to be of sufficient value to constitute a species even in the vague sense the term has acquired in Orchidology. Almost the only differences between the two forms are, that in *D. thyrsiflorum* the stems are terete and not angulate; they are also longer

* This plate does not do justice to the flowers.



Dendrobium thyrsiflorum.

and more slender, hence the two plants can be easily distinguished from each other when not in flower; also the sepals and petals of *D. thyrsiflorum* are white, but as there is a white variety of *D. densiflorum*,* quite distinct from *D. thyrsiflorum*, it is the more desirable that the latter should have a designation by which it may not be easily confounded with the former.

Dendrobium thyrsiflorum is a native of the forests of Moulmein and of the Kargen district of Lower Burmah, and was introduced, in 1864, by Messrs. Low and Co., through the Rev. C. Parish, its discoverer. It flowers in April and May, and has, since its first introduction, been regarded by horticulturists as one of the most beautiful of the genus.

D. tortile.

EUDENDROBIUM—*Fasciculata*. Stems club-shaped, attenuated below, 9—12 inches long, compressed, furrowed, yellow-green when old. Leaves lanceolate-oblong, obliquely emarginate, 3—4 inches long. Flowers 3 inches across, in fascicles of twos and threes, but sometimes solitary, produced from the uppermost joints; sepals and petals narrowly oblong, twisted, pale rosy lilac; lip sub-orbicular when spread out, convolute at base, pale primrose-yellow with a purple blotch at base, from which some purple streaks radiate laterally. Column green, anther case purple.

Dendrobium tortile, Lindl. in Gard. Chron. 1847, p. 797. Bot. Mag. t. 4477.

Introduced by us, in 1847, from the Mergui district in Tenasserim, through Thomas Lobb. An inferior variety is also found on the Arracan Hills. It is closely allied to *Dendrobium primulinum* and *D. Pierardi*, but easily distinguished from both by its club-shaped stems and twisted sepals and petals, the last-named peculiarity suggesting the specific name. It flowers in June and July.

D. transparens.

EUDENDROBIUM—*Fasciculata*. Stems slender, 12—18 inches long. Leaves linear-lanceolate, 3—4 inches long, deciduous. Flowers 1½ inches in diameter, on purplish pedicels, in fascicles of twos and threes from the leafless shoots; sepals lanceolate, white tinted with pale rosy mauve towards their tip; petals elliptic-oblong, acute, similarly coloured; lip ovate-oblong, with a short claw, which with the obscure side lobes is rolled over the column, white with two deeper purple stains on the disc, pale mauve-purple at the apex.

Dendrobium transparens, Wallich. Lindl. Gen. et Sp. Orch. p. 79 (1831). Paxt. Fl. Gard. I. t. 27. Bot. Mag. t. 4663.

* *D. densiflorum* Schroederi, *supra*.

A beautiful species, abundant in many of the valleys of the lower Himalayan zone. It was discovered by Dr. Wallich in the early part of the present century, but not introduced to European gardens till 1852, in which year Thomas Lobb collected it on the Garrow Hills, at a place called Myrone, 5,000 feet above sea-level, and sent it to the Exeter firm. It was shortly afterwards sent to Kew from Assam, by Simons. It usually flowers in March.

D. Treacherianum.

SARCOPODIUM. Rhizome stoutish, creeping. Pseudo-bulbs crowded, ovoid, angulate, slightly curved, 2—3 inches long, diphylloous. Leaves linear-oblong, 3—4 inches long, generally emarginate, leathery in texture. Peduncles erect, sheathed at the base and at each joint by reddish brown bracts, 2—5 flowered. Flowers 1½—2 inches across; sepals and petals linear-lanceolate, pale pinkish mauve, passing to white at the margins; lip deep red-crimson, three-lobed; the side lobes narrow with the anterior angle prominent; the middle lobe linear-oblong, acuminate, tri-lamellate.

Dendrobium Treacherianum, Rehb. MSS. *fide Bot. Mag.* t. 6591. Williams' *Orch. Alb.* VI. t. 288.

A curious Dendrobie, one of the very few cultivated species included in the section **SARCOPODIUM**, a group that imitates the *Bulbophyllum*s in having creeping rhizomes, two-leaved pseudo-bulbs, and flowers usually with narrow segments. It is a native of Borneo, whence it was introduced by Messrs. Low and Co., in 1881, and named in compliment to Mr. W. H. Treacher, the Colonial Secretary at Labuan.

D. Wardianum.

EUDENDROBIUM—Faeciculata. Stems terete, knotted, pendent, 24—36 or more inches long, the larger ones as thick as the little finger. Leaves oblong-lanceolate, acute, 4—5 inches long, deciduous. Flowers usually in twos and threes, 3—4 inches across, of smooth wax-like texture; sepals oblong, sometimes entirely white, but generally with an amethyst-purple blotch at the tip; petals oval, nearly as broad again as the sepals, white, heavily tipped with amethyst-purple; lip sub-orbicular, convolute over the column at the base, bright ochreous-yellow with two maroon blotches at the base, the anterior part white with an amethyst-purple blotch at the apex.

Dendrobium Wardianum, Warner, *Sel. Orch. I.* t. 19 (1862-5). *Illus. hort. s. 3, t. 277. Fl. Mag. n. s. t. 212* (var. *Lowii*). Williams' *Orch. Alb. III.* t. 113 (giganteum). Sander's *Reichenbachia*, I. t. 9.

var.—assamicum.

Stems shorter and more slender, leaves narrower, and the flowers smaller in all their parts, but more brilliantly coloured than in the form described above.

D. Wardianum assamicum, supra. Jennings' *Orch.* t. 2. D. Falconeri sepalis petalique obtusioribus, *Bot. Mag.* t. 5058.

sub-var.—candidum, flowers white, except the orange-yellow disc of lip, on which are two light red-brown blotches near the base.

D. Wardianum candidum, Rehb. in *Gard. Chron.* V. (1876), p. 460.

Two distinct forms of this superb Dendrobium, received from two different localities, are known in gardens; one from Burmah, with long stems that produce large flowers, and the other from Assam



Dendrobium Wardianum.

and the Khasia Hills, with shorter and more slender stems, that produce smaller flowers with brighter colours than the Burmese form. The Assam form was introduced first; it was collected by Simons, about the year 1856, and one of the plants sent home by him flowered in Messrs. Jackson's Nursery, in the spring of 1858, and was figured and described in the *Botanical Magazine* as a variety of *Dendrobium Falconeri*. About the same time, or in the following season, a plant (whether one of Simons' or not it is not stated) flowered in the stove of Dr. Ward, at Southampton, which showed a more marked deviation from *D. Falconeri* than that figured in

the *Botanical Magazine*. This was named *D. Wardianum*, in compliment to the owner, by Mr. Warner, who figured and described the species for the first time, as such, in his *Select Orchidaceous Plants*, not from Dr. Ward's plant, but from another in the collection of the late Mr. Day, at Tottenham, who had cultivated it under the name of *D. Falconeri obtusum*.* The long-stemmed form was first introduced from Burmah, in 1875, by Messrs. Low and Co., and on account of its robust growth and magnificent flowers, became at once the popular *D. Wardianum*, which the thousands of plants of the same form since imported have tended to confirm. By the strict law of botanical nomenclature, the Assam form, as figured by Warner, should be the typical *D. Wardianum*, and the robust Burmese form should rank only as a variety, but the exigencies of horticulture have reversed this order, especially as the Assam form is more difficult to cultivate successfully. The sub-variety, *candidum*, was introduced by Messrs. Low and Co. amongst their first Burmese importations.

D. xanthophlebium.

EUDENDROBIUM—Formose. Stems tufted, 12 or more inches long, as thick as an ordinary writing pencil. Leaves near the summit only, linear-lanceolate, 2–3 inches long, obliquely emarginate. Flowers in pairs or solitary, 1½–2 inches in diameter; sepals and petals white, the former lanceolate, the latter broader, ovate; lip three-lobed; the side lobes nearly triangular, white spotted with orange; the intermediate lobe sub-round, wavy, with an orange disc and white margin.

Dendrobium xanthophlebium, Lindl. in *Gard. Chron.* 1857, p. 268. *D. marginatum*, Batem. in *Bot. Mag.* t. 5454 (1864).

Introduced by us, through Thomas Lobb (date uncertain), from Moulmein, whence it was subsequently sent to Messrs. Low and Co., by the Rev. C. Parish. It is now rarely seen in orchid collections.

HYBRID DENDROBIUMS.

Hybrid Orchids, whether brought into existence by the agency of Nature or by the hand of Man, have become so familiar an element in almost every collection of note, that when we contemplate the great genus *Dendrobium* in all its aspects, it becomes a matter of some surprise that so few natural hybrids, or forms that would be recognised as such, have as yet made their appear-

* Warner's *Sel. Orch.* I. sub. t. 19.

ance among the numerous importations of species of *Dendrobium* that have of late years filled the orchid houses of Europe to overflowing. But so it is—with the solitary exception of *D. crassinodi-Wardianum*, an undoubted natural hybrid, we know of no other well-attested instance, although from time to time, hypotheses have been hazarded respecting the hybrid origin of some of the Dendrobes in cultivation, but which, since their first appearance, have been generally accepted as good species. So long ago as 1874, Professor Reichenbach (*Xen. Orch.* II. p. 209—10), when pointing out the difficulty attending the identification of certain Dendrobes from their flowers only—a difficulty greatly heightened when the flowers come to hand in a dried state, instancing *D. Bozalli*, *D. crystallinum*, *D. Findlayanum*, and *D. gratioissimum*—suggested the possibility of at least two of these being natural hybrids, viz., *D. Bozalli* between *D. gratioissimum* and *D. crassinode*, and *D. Findlayanum* between *D. Aphrodite* and *D. gratioissimum*.* But this theory has thus far failed to find acceptance, the chief fact that militates against it being the quantity in which both have been imported, a fact that affords sufficient ground for giving them specific rank, apart from some structural peculiarities that cannot be reconciled with their supposed hybrid origin. *D. rhodopterygium* has been adduced as another instance of a natural hybrid, the supposed parents being *D. Pierardi* and *D. Parishii*, but here again, although the probability is much stronger than in the preceding cases, further evidence appears to be undoubtedly wanting to establish the hypothesis.

Into the causes of this paucity of natural hybrids in this genus it is not our present purpose to inquire; we simply note the fact as one among the many unsolved mysteries of orchid life.

Even muling among Dendrobes by hand is, comparatively speaking, still in its infancy, large as is the field offered by the genus for the operations of the hybridist. Dominy raised the hybrid that bears his name many years ago at the Exeter Nursery; he was followed at intervals by various operators, the most successful of whom is Seden, who, by widening the area of his operations, has

* In his own words, "Es ist sehr wahrscheinlich dass Bastardirungen vorkommen, zu denen vielleicht sogar *Dendrobium Aphrodite*, *D. Bensoniae*, und *D. Parishii* ihre contingente liefern. Wer könnte sich dem Verdachte entziehen dass aus *D. gratioissimum* und *crassinode*, das *Bozalli* werde? Und ist vielleicht *D. Findlayanum* ein Product des *D. Aphrodite* und *gratioissimum*."

obtained as many new forms as all the other operators put together. Of the fourteen hybrid Dendrobes described below, *Dendrobium nobile* is one parent of six of them, and has participated in the parentage of one more, and *D. aureum* is one parent of three of the same six and of two others, so that only five hybrids have yet flowered that have a parentage in which neither of these species has participated, and for the production of these five hybrids six species only have been used that have not shared in the parentage of the *nobile* and *aureum* hybrids. In every case both the vegetative and floral organs of the progeny have taken a form intermediate between those of the parents, the form of these organs is, with very few exceptions, purposely omitted in the following descriptions.



Dendrobium Ainsworthii.
(From the *Gardeners' Chronicle*.)

Dendrobium Ainsworthii.

D. aureum × *D. nobile*.

Flowers 2—3 inches across; the French-white sepals and petals sometimes tinted with rose-purple towards the tips; and the lip always with a deep amethyst-red disc, with numerous radiating streaks of the same colour.

Dendrobium Ainsworthii, Moore in *Gard. Chron.* I. (1874), p. 443. *Fl. Mag.* n. s. t. 126. *D. Ainsworthii roseum*, Williams' *Orch. Alb.* I. t. 20.

Raised in the collection of Dr. Ainsworth, at Lower Broughton, near Manchester,* where it flowered for the first time in the spring of 1874. A variety with larger flowers having rose-purple sepals and petals is known in cultivation under the name of *Dendrobium Ainsworthii roseum*.

D. Chlorostele.†

D. Linacianum × *D. Wardianum*.

Stems like those of *Dendrobium Linacianum*. Flowers somewhat resembling a broad-petalled *D. nobile*; sepals white margined with purple; basal half of petals white, distal half purple; central area of lip amaranth-purple with radiating lines, bordered in front with pale yellow, apical margin pale purple. Column green, anther purple.

Dendrobium Chlorostele, Rehb. in *Gard. Chron.* I. s. 3 (1887), p. 477.

Raised in Sir Trevor Lawrence's collection at Burford Lodge, near Dorking.

D. Chrysodiscus.

D. Ainsworthii × *D. Findlayanum*.

Stems intermediate between those of the two parents, amber-yellow with the nodes slightly swollen laterally. Sepals and petals white with purple apicular blotches; lip yellow-white with orange-yellow disc, at the base of which is a purple stain, and with a purple apical blotch.

Dendrobium Chrysodiscus, Rehb. in *Gard. Chron.* I. s. 3 (1887), p. 414.

var.—*oculatum*.

The apicular blotch on the sepals and petals larger and of a deeper colour; the lip with a deep maroon disc surrounded by a bright yellow zone.

D. Chrysodiscus oculatum, supra.

A very distinct hybrid raised in Sir Trevor Lawrence's collection, at Burford Lodge. Plants were also raised from the *vice versa* cross that produce flowers not differing much from the original *Dendrobium Ainsworthii*. The *vice versa* cross has been named *D. Melanodiscus*, by Professor Reichenbach, loc. cit. supra. The variety *oculatum* is the most beautiful of all the forms of this cross that we have yet seen.

D. Cybele.

D. Findlayanum × *D. nobile*.

Stems like those of *Dendrobium nobile*, but more compressed, with the internodes swollen laterally. Flowers more nearly like those of the

* Plants of the same cross raised by West appeared about the same time in the Fairfield Nursery, near Manchester.

† Not seen by us. From χλωρός, "green," like grass, and στήλη, "pillar," probably in reference to the green column of the flower.

pollen than of the seed parent (*D. Findlayanum*); sepals and petals white slightly tipped with pale rose; lip white faintly suffused with pale yellow, and with a crimson-purple blotch at the base.

Dendrobium Cybele, Rolfe in Gard. Chron. II. s. 3 (1887), p. 778.

Raised by Seden at our nursery. In this hybrid the preponderance of the pollen parent is more than usually marked; the conspicuous yellow of the lip of *Dendrobium Findlayanum* is here totally lost.

D. Dominianum.

D. nobile × *D. Linarvianum*.

Sepals mauve-purple; petals bright rose-purple at the apex, paler towards the base where they are nearly white; lip white with a maroon-purple disc, and a rose-purple apex.

Dendrobium Dominianum, Rehb. in Gard. Chron. IX. (1878), p. 202.

Raised by Dominy at the Exeter Nursery, and in cultivation many years prior to the date of the published description.



Dendrobium Endocharis.

D. Endocharis.

D. japonicum × *D. aureum*.

Flowers fragrant, nearly as large as those of the pollen parent (*Dendrobium aureum*), milk-white with a crimson-purple striated blotch at the base of the lip.

Dendrobium Endocharis.,* Rehb. in Gard. Chron. V. (1876), p. 298.

This hybrid has more of the robust habit of *Dendrobium aureum* than of the slender, dwarf, tufted *D. japonicum*. Its chaste flowers, together with their delightful violet fragrance, render it one of the most admired of hybrid Dendrobes. It was raised by Seden.

D. euosmum.

D. Endocharis × *D. nobile*.

Flowers fragrant, as large as those of *Dendrobium nobile*; sepals and petals white tipped with pale rosy purple, as is also the lip, the disc of which is maroon-purple surrounded by white. Column pale green with some purple streaks below the stigmatic hollow.

Dendrobium euosmum, Rehb. in Gard. Chron. XXIII. (1885), p. 174.

sub-vars.—*leucopterum* (Gard. Chron. XXV. (1886), p. 488), sepals, petals and lip pure white, except the disc of the latter which is Indian-purple, paler than in the type; *roseum*, sepals and petals toned with rose-purple, which is of a much deeper shade at the apex, the apical blotch on the lip deeper than in the type.

Raised by Seden. The influence of the pollen parent is here conspicuously manifested in the form and colour of the flower, while that of the seed parent—itself a hybrid—is chiefly noticeable in its fragrance, and which suggested the name.† It is one of the most beautiful hybrid Dendrobes yet raised, especially the sub-variety *leucopterum*.

D. Leechianum.

D. nobile × *D. aureum*.

Flowers 3 inches across, white with the tip of the sepals and petals rosy purple, the lip with a large purple blotch with deeper radiating streaks, and surrounded by a pale yellow zone.

Dendrobium Leechianum, Rehb. in Gard. Chron. XVII (1882), p. 256.

Raised by Swan in the collection of Mr. W. Leech, at Fallowfield, near Manchester. It comes very near our own *Dendrobium splendissimum*, from which, says Professor Reichenbach, it differs chiefly "in the narrower, more acute, and wavy petals, and in its lip being lobed as in *D. aureum*."

D. micans.

D. Wardianum × *D. lituiflorum*.

Flowers with the glossy wax-like texture of *Dendrobium Wardianum*, 3 inches or more across; sepals and petals mauve-purple, paler towards the base; lip nearly, as in *D. lituiflorum*, white with a large maroon-purple disc, and a rose-purple blotch at the apex.

Dendrobium micans, Rehb. in Gard. Chron. XI. (1879), p. 332.

* From ἐνδός, "within," "inward," and χάρις, "joy," "satisfaction."

† From εὖ, "well," and ὄσμη, "fragrance."

Raised by Seden in our nursery. Flowers of the Assam or short and slender-stemmed variety of *Dendrobium Wardianum*, as well as of the Burmese or long and robust-stemmed form, were fertilised with the pollen of *D. lituiflorum*. The flowers of the progeny derived from both crosses are identical except in colour, those derived from the Assam form having the sepals and petals more deeply coloured, and disc of the lip larger; also the stems of the plants of which this form was one parent are shorter and more slender than those in which the Burmese form share the parentage.

D. porphyrogastrum.

D. Huttonii × *D. Dalhousieanum*.

Flowers 2—3 inches across; sepals and petals similar and sub-equal, pale rosy mauve, the petals a little more deeply coloured than the sepals; lip pale rose-purple and white, with a deep purple spotted disc; the margin is ciliolate, and the spur short and funnel-shaped.

Dendrobium porphyrogastrum,* Rehb. in lit.

Raised by Seden in our nursery; it is the most remarkable cross amongst Dendrobiums yet known to us.

D. Rhodostoma.

D. Huttonii × *D. sanguinolentum*.

Flowers about 2 inches in diameter, much like those of the pollen parent *Dendrobium sanguinolentum*; sepals white tipped with purplish crimson; petals broader with a larger blotch at the tip; lip purplish crimson with a yellowish maroon disc.

Dendrobium Rhodostoma,† Rehb. in Gard. Chron. V. (1876), p. 795.

Raised by Seden in our nursery.

D. Schneiderianum.

D. Findlayanum × *D. aureum*.

Stems nodose as in *Dendrobium Findlayanum*. Flowers as large as the best *D. aureum* forms; sepals and petals white tipped with lilac-purple; lip orange-yellow with a large sub-orbicular pubescent disc, from which radiate deep purple lines, and which is surrounded by a broad whitish zone, apical area lilac-purple. Column with some purple lines in front and a purple blotch above.

Dendrobium Schneiderianum, Rehb. in Gard. Chron. I. s. 3 (1887), p. 209.

The cross was effected in the collection of Mr. Oscar Schneider, at Fallowfield, near Manchester; the plants were raised by Mr. Holmes, gardener to Mr. C. Moseley, at Grange Thorpe, Rusholme, Manchester, their present possessor. The large orange-yellow disc of the lip streaked with purple is the most marked characteristic of the hybrid.

* From πορφύρα, "purple," and γαστρός, "ventral."

† From ρόδος, "the rose," "rose-coloured," and στόμα, "the mouth," "the face."

D. splendidissimum.*D. aureum* × *D. nobile*.

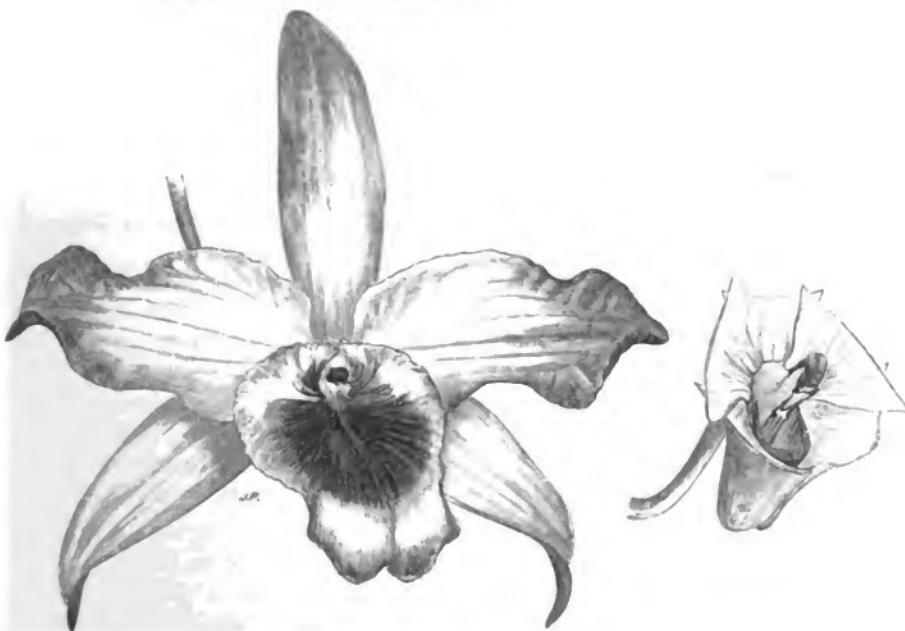
Flowers 3—4 inches across with a glossy varnished surface; sepals and petals white tipped with rosy mauve; lip with an Indian-purple disc shaded with maroon, and surrounded by a pale yellow zone.

Dendrobium splendidissimum, Rehb. in Gard. Chron. XI. (1879), p. 298.

var.—grandiflorum.

Flowers larger with all the segments broader; sepals and petals rose-purple at the tips, becoming paler towards the base where they are white, the petals gently reflexed; the disc of lip unusually large, of the richest Indian-purple surrounded by a pale yellow zone; apex rose-purple.

D. splendidissimum grandiflorum, supra.



Dendrobium splendidissimum grandiflorum.

Raised by Selen in our nursery. This is the third type of progenies obtained by different operators from the same or a *rice versatilis* cross. The seedlings raised from all the crosses are found to be variable, members of one progeny approaching so closely varieties among the others that the original distinctions set up between them cease to be appreciable; we are of opinion, therefore, that the three

names should for the present be bracketed in their chronological order thus, *Dendrobium Ainsworthii*, *D. splendidissimum*, *D. Leechianum*, leaving it to future experience to decide whether the separate names shall be retained, or whether the second, or third, or both, must sink as synonyms of the first. The variety *grandiflorum* is not only the largest of the forms obtained from the *aureo-nobile* crosses, but it is also the most distinct; this result is due to one of the finest forms of each species having been selected for parents.

D. Vannerianum.

D. japonicum × *D. Falconeri*.

Flowers much resembling those of *Dendrobium transparens*; all the segments narrowed and pointed; sepals white with narrow purple margins; petals and lip also white, the former with a purple apical blotch, the latter with an oval blotch on the disc, and the apical area also purple.

Dendrobium Vannerianum, Rchb. in *Gard. Chron. l. s. 3* (1887), p. 72.

Raised by Mr. Vanner, of Camden Wood, Chislehurst.

BULBOHYLLUM.

Thouars, *Orch. Iles. Afr.* 1822. *Lindl. Gen. et Sp. Orch.* p. 50 (1831). *Benth. et Hook. Gen. Plant. III.* p. 501 (1833).

In the scientific arrangement of the Orchidæ, *Bulbophyllum* follows close upon *Dendrobium*, with which genus it is to some extent geographically associated.* Its geographical range, however, greatly exceeds that of *Dendrobium*, for the genus is not only represented by several species in Africa, especially at Sierra Leone, but also by a few species in Central and South America,† an instance somewhat rare among tropical orchids of the same genus being represented in both the Old and New World. By far the greatest number of the *Bulbophyls* are East Indian and Malayan, whence they spread into Australia and even New Zealand, where the minute *Bulbophyllum pygmaeum* has its home. With so vast a geographical range, it is not surprising that the genus, as a whole, should be somewhat polymorphous, although as regards the greater number

* *Bulbophyllum* differs chiefly from *Dendrobium* in the inflorescence, "the leafless scapes arising from the rhizome either at the base of, or at a distance from the leaf-bearing stems or pseudo-bulbs."—*Bentham*, in *Jour. Linn. Soc. XVIII.* p. 297. The curious *Dendrobium amplum*, of the Khasia Hills, and the Bornean *D. Treacherianum* are connecting links between the two genera.

† Dr. Lindley (*Pol. Orch.*) separated seven Brazilian species from *Bulbophyllum*, and constituted them a new genus which he called *Didactyle*, but in this he is not followed by later botanists.

of the included species it is, according to Mr. Bentham, a fairly natural one.

In consequence of the diversity in form, size and structure observable in the flowers of the included species, a full diagnosis of the genus would greatly exceed our limits. In the vegetative organs, too, there is considerable variability among the species, some being amongst the smallest orchids known, while others attain (for orchids) gigantic dimensions. Generally the pseudo-bulbs are of small size, sometimes clustered, but more frequently produced at greater or less intervals from a creeping rhizome, which in one species at least, *Bulbophyllum Beccarii*, is of extraordinary thickness.

Of the eighty or more species known to science, a considerable number have at one time or other been received into European gardens, but in many instances soon to disappear from them. The *Bulbophyls* have more attraction for the botanist than for the amateur cultivator of orchids; nevertheless, the singular form and structure of the flowers of some, and the peculiar coloration of others should render such plants objects of interest even where the more showy species of other genera hold privileged sway. The species presently to be described are among the most remarkable known to us; they are, with one exception, figured in the *Botanical Magazine*, from which source our descriptions have for the most part been derived.

Cultural Note.—The following species are all natives of the equatorial zone, of which the climatic conditions are stated at length in the introductory notes on *Dendrobium*. They should be grown in the East-India house, where they should receive the same general treatment as the *Dendrobes* and other occupants of that house, provision being made for the rambling habit of those species that have long creeping rhizomes. The smaller species thrive best suspended near the roof glass, where they can receive the maximum of light and air.

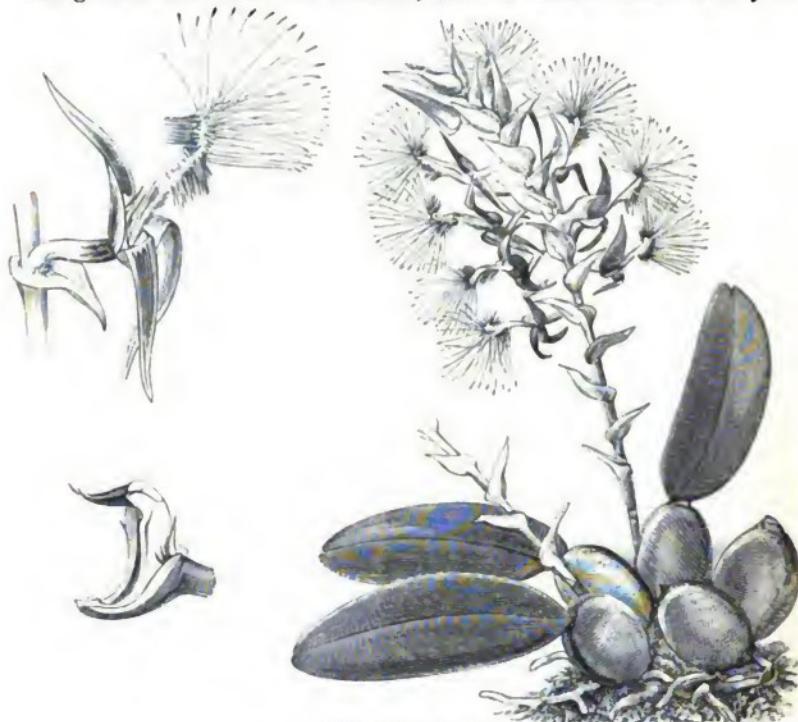
Bulbophyllum barbigerum.

Pseudo-bulbs lenticular, less than an inch in diameter, monophyllous. Leaf oblong, fleshy. Peduncles racemose along the distal half, 7—12 flowered, each flower with a broad amplexicaul bract at the base of its pedicel; sepals linear-lanceolate, tapering to a point, dull chocolate-brown; petals reduced to minute scales; lip long, narrow, flexuose and pointed, covered with a yellow felt, bearded just within the point and terminating in a brush consisting of long, purple threads. Column short, with two curved horns at the apex.

Bulbophyllum barbigerum, Lindl. in *Bot. Reg.* 1837. t. 1942. *Bot. Mag.* t. 5288.

Native of Sierra Leone, whence it was imported by Messrs.

Loddiges, in 1836. It is a most curious orchid, which we have seen in flower in Sir Trevor Lawrence's collection at Burford Lodge on more than one occasion, and we cannot better convey an



Bulbophyllum barbigerum.

(Copied from the *Botanical Magazine*.)

idea of some of its peculiarities than by transcribing the following particulars from Dr. Lindley's description in the *Botanical Register* :—

"The lip is one of the most extraordinary organs known, even among orchidaceous plants; the very long purple threads forming the brush at the point of the lip are so excessively delicate that the slightest disturbance of the air sets them in motion, when they wave gently to and fro like a tuft of threads cut from a spider's web. Nor is this all; the lip itself, with its yellow felt, its two beards and its long purple brush, is articulated with the column by such a very slight joint, that to breathe upon it is sufficient to produce a rocking movement, so conspicuous and protracted that one is tempted to believe that there must be something of an animal nature infused into this most unplant-like production."

B. Beccarii.

"Rhizome as thick as the thumb, winding round the trunks of trees to which it adheres by numerous root fibres from its under surface, smooth, cylindric, green. Pseudo-bulbs rather distant, 2 inches in diameter and upwards, nearly globose, monophyllous. Leaves 12—24 inches long by 9—18 inches broad, sub-acute, abruptly narrowed at the concave base, thickly coriaceous. Peduncles short, decurved, thickly clothed with imbricating, ovate, acute sheaths of a dull purple colour streaked with red. Racemes pendulous, dense-flowered and foetid; bracts almost equalling the flowers, lanceolate, acuminate, pale lilac streaked with red. Flowers $\frac{1}{2}$ of an inch in diameter; sepals ovate-oblong, yellowish with red reticulations; petals lanceolate, acuminate, dull yellow with central red band; lip ovate-lanceolate, obtuse, recurved, yellow with red ribs on the disc. Column with two short teeth in front at the tip."—*Botanical Magazine*.

Bulbophyllum Beccarii, Rchb. in *Gard. Chron.* XI. (1879), p. 41. *Id. XIV.* (1880), pp. 326, 525. *Bot. Mag.* t. 6567.

A most remarkable orchid in more senses than one; in size it is one of the most gigantic, its enormous rhizome encircling the trees to which it is attached, like the coils of a serpent; its racemes of flowers are among the largest and densest in the Order, but the flowers emit an odour so loathsome as to permanently exclude the plant from general cultivation, its foetor rivalling that of the most offensive Aroid known.

Bulbophyllum Beccarii was first discovered in Borneo, in 1853, by Thomas Lobb, who sent home a leaf only, which is still in the Lindley herbarium, now preserved at Kew. It was rediscovered, in 1867, by Professor Beccari, an Italian botanist, who has rendered lasting service to science by exploring parts of the great Oriental Archipelago not previously known.

B. Dearei.

Pseudo-bulbs clustered, varying in size from that of a small filbert to that of a large walnut, monophyllous. Leaves oval-oblong, acute, 4—6 inches long. Peduncles erect, as long as the leaves, one-flowered. Flowers large and showy; dorsal sepal ovate-lanceolate, tawny yellow spotted with red; lateral sepals lanceolate, falcate, dilated, and saccate at the base with some purple markings on both sides; petals linear-lanceolate, tawny yellow with deeper veins and some reddish purple spots; lip articulated with the foot of the column by a flexible claw, triangular with the lateral angles turned upwards, and the anterior one reflexed; calli U-shaped, whitish mottled with purple. Column very short, deep tawny yellow margined with red.

*Bulbophyllum Dearei, supra.**

A beautiful species, in cultivation at Burford Lodge, of which we have failed to find any published description, or any authority for the name which is unquestionably that of the gallant officer who introduced *Dendrobium Dearei*, and thence the plant may be assumed to be of Philippine origin. The structure of the flower is as curious as the flower itself is beautiful; this is especially seen in the labellum, with its curious U-shaped crest. This remarkable organ is so delicately poised upon its flexible claw, that it vibrates rapidly upon the slightest movement imparted to the plant.

B. lemniscatum.

"Pseudo-bulbs $\frac{1}{2}$ — $\frac{3}{4}$ inch in diameter. Leaves $1\frac{1}{2}$ —2 inches long, in a tuft of three or four from base of pseudo-bulb, elliptic-lanceolate, deciduous. Scapes slender, 4—6 inches high, with two or three short sheaths below the middle, and one long, slightly inflated one, above it. Flowers small, crowded on a pendulous spike at the extremity of the scape; sepals orbicular-ovate, dark purple, setose, with long spreading hairs and with an appendage at the base; petals linear-lanceolate, white with a purple streak; lip broadly ovate, recurved, convex, dark blue-purple."—*Botanical Magazine*.

Bulbophyllum lemniscatum, Parish, M.S. *sive* Hook. f. *Bot. Mag.* 1872, t. 5961.
Van Houtte's *Fl. des Serres*, t. 2476 (copied from *Bot. Mag.*).

Sir J. D. Hooker remarks of this:—

"That a more singular little gem of an orchid cannot well be imagined. Its curious, glossy, tubercled pseudo-bulbs, its capillary scape, its pendulous spike of glistening minute flowers, and, above all, its slender appendages that hang one from the back of each sepal, and which are as curious in structure as beautiful in colouring, together seem to mark it as the type of a new genus. . . . The elaborate structure of the appendages of the sepals deserves special notice. Each consists of a narrow club-shaped, very flaccid body, three to four times as long as the flower, and is gradually narrowed into a filiform pedicel. On superficial examination it appears to be ten-sided, but on a transverse section is proved to consist of a capillary axis from which radiate ten longitudinal, crenate, undulate plates of extreme delicacy. The whole organ is not more than one-sixth to one-fourth of an inch long, of a brilliant red-purple colour, transversely banded with white. Of its possible use I can form no conception; it falls off as the flower expands."

This curious orchid was discovered by the Rev. C. Parish, in 1868, growing on an old shingle roof at Zwakabin, in Moulmein.

* It was exhibited by Sir Trevor Lawrence, Bart., under this name, at the Orchid Conference held at South Kensington in May, 1885.

B. Lobbii.

Pseudo-bulbs produced from a scaly rhizome at intervals of about an inch, ovoid, $1\frac{1}{2}$ inches long, monophyllous. Leaves petiolate, oblong, 6 inches long. Scapes shorter than the leaves, one-flowered. Flowers spreading, 3—4 inches across; sepals lanceolate, acuminate, buff-yellow, the dorsal one marked with lines of purple spots at the back, the lateral two falcate, and stained with rosy purple in the centre; petals like the dorsal sepal but smaller; lip shorter than the other segments, cordate, acute, reflexed, yellow spotted with purple, as is the short and broad column.

Bulbophyllum Lobbii, Lind. in Bot. Reg. 1847, sub. t. 29. *Bot. Mag.* t. 4532.

var.—siamense.

Leaves longer and more leathery than in the type. Flowers lemon-yellow, veined and dotted with reddish crimson.

B. Lobbii siamense, Rehb. in Saundier's *Rep. Bot. II.* t. 118. *B. Siamense*, Rehb. in Gard. Chron. 1867, p. 592.

This and *Bulbophyllum Dearii* are almost the only Bulbophyls that have flowers sufficiently large and showy to gain admission into the orchid collections of many amateurs. *B. Lobbii* was sent to the Exeter Nursery, in 1846, from Java, by Thomas Lobb. The variety was introduced 20 years later, by the late Mr. Day; it was also sent about the same time to Messrs. Low and Co., from Moulmein, by the Rev. C. Parish, and shortly afterwards to the Royal Gardens at Kew, by Colonel Benson.

B. reticulatum.

"Pseudo-bulbs ovoid, about an inch long, monophyllous. Leaves large, ovate-cordate, acuminate, much nerved, the longitudinal and transverse deep green nerves producing a beautiful reticulation on the paler green of the blade. Peduncles short, covered with sheathing bracts, two-flowered. Flowers whitish striped with red-purple, the stripes sometimes broken up into spots; dorsal sepal ovate-lanceolate, acuminate; lateral sepals much broader at the base, falcate and decurved; petals like the dorsal sepal, but smaller and more pointed; lip trowel-shaped, recurved." *Botanical Magazine*.

Bulbophyllum reticulatum, Batem. M.S. Hook. f. *Bot. Mag.* t. 5605.

This is also one of Thomas Lobb's discoveries, which he sent to the Exeter Nursery, from North Borneo, about the year 1852. Its handsome leaves and singular flowers render it a very interesting species.

B. umbellatum.

Pseudo-bulbs not crowded, oblong-ovate, compressed, $1\frac{1}{2}$ —2 inches long. Leaves oblong, petiolate, 5—8 inches long. Scapes from the base of the

latest-formed pseudo-bulbs, slender, erect, longer than the leaves, bearing at their summit an umbel of 5—7 flowers somewhat less than an inch across; sepals and petals pale yellow spotted with red, all of oval form, the lateral sepals the largest, the petals the smallest, the dorsal sepal being intermediate in size; lip very small, cordate-oblong, emarginate, reflexed, white with purple blotch and spots. Column very short, winged and with a small horn on each side of the anther case.

Bulbophyllum umbellatum, Lindl. Gen. et Sp. Orch. p. 56 (1831). Id. Bot. Reg. 1845, t. 44. Bot. Mag. t. 4267.

First discovered by Dr. Wallich's collectors, in Nepaul, in 1821, but not known as a garden plant till Gibson sent it from the Khasia Hills to Chatsworth, where it flowered for the first time in 1838. It has occasionally been re-introduced since along with other orchids from the lower Himalayan zone.

Although the flowers are produced in umbels like the *Cirrhopetala*, to which this species closely approaches, it may easily be distinguished from them by its broad lateral sepals that are not parallel.

CIRRHOPETALUM.

Lindl. Bot. Reg. sub. t. 832 (1824). Id. Gen. et Sp. Orch. p. 58 (1831). Benth. et Hook. Gen. Plant. III. p. 504 (1883).

The genus *Cirrhopetalum* was founded by Lindley upon *C. Thouarsii*, which he separated from *Bulbophyllum* on account of its differing from all the species of that genus then known, in various characteristics, some of which are described below. Many years afterwards, Lindley's *Cirrhopetalum* was again merged into *Bulbophyllum*, by Reichenbach, but subsequently retained by him in articles published in the *Gardeners' Chronicle*.* It is also retained by Bentham and Hooker in the *Genera Plantarum*, who include in it the *Bulbophyllopsis maculata*, of Reichenbach. The genus consists of about thirty species, the greater part of which are East-Indian, or are natives of the Malay Archipelago. One is reported from Mauritius, another from China, and a third from Australia; the Australian species is, however, anomalous, and is referred by some botanists to *Cirrhopetalum* and by others to *Bulbophyllum*.†

* Walper's Annales Botanices, VI. (1861), p. 261. Gard. Chron. XVI. (1881), p. 70, and XVIII. (1882), p. 424.

† *Cirrhopetalum Makoyanum* (Rehb. in Gard. Chron. XI. (1879), p. 234), is said to have been introduced from the province of Minas Geraes, in Brazil.

Mr. Hemsley enumerates seventeen species of *Cirrhopteratum* that have been at one time or other introduced into European gardens up to 1882,* and two or three others have been added since; but of all these it is doubtful whether half-a-dozen are to be found in any one orchid collection at the present time. Nevertheless, a complete collection of *Cirrhopterata* in a living state would meet one of the *desiderata* of science at the present time.

Among the most obvious characteristics by which the *Cirrhopterata* may be recognised, are their small monophyllous pseudo-bulbs produced from a scaly creeping rhizome; in this respect, however, they agree with many *Bulbophyllums*; also their umbellate inflorescence, or rather racemes, reduced to an umbel which is frequently one-sided; and their elongated parallel lateral sepals, which in one species, *Cirrhopteratum Medusa*, are enormously prolonged. These parallel sepals, owing to a peculiar twist at their base, are brought into the same plane with their inner edges, meeting together like the wings of some insects.

Cirrhopteratum is from *κίρρος* (kirrhos), "yellowish," and *πέταλον* (petalon), "a leaf." The name was selected by Dr. Lindley on account of the prevailing yellow colour in the sepals of all the species known to him. The cultural requirements are the same as for *Bulbophyllum*.

Cirrhopteratum chinense.

Pseudo-bulbs somewhat distantly placed on the scaly creeping rhizome, small, oval-oblong, an inch long, invested with scarious sheaths. Leaves narrowly lanceolate, 4—5 inches long, emarginate or obliquely two-lobed at apex. Scapes as long as the leaves, bearing at their summit a many-flowered umbel. Dorsal sepal helmet-shaped, pale yellow at the base, stained with purple at the apex; lateral sepals lanceolate, pale fawn-yellow; petals oblong, obtuse, apiculate, coloured like the dorsal sepal; lip small, fleshy, tongue-shaped, deep purple.

Cirrhopteratum chinense, Lindl. in Bot. Reg. 1842, misc. 29. *Id.* 1843, t. 49.

A curious species, introduced from China by Messrs. Loddiges about the year 1842. Dr. Lindley appended the following note to his description of it:—

"There is no longer any occasion for speculative minds to occupy themselves with the investigation of the cause that may have led the Chinese to invent strange figures of men and women with their chins perpetually in motion, for here is the explanation of it. We have here a plant from China, one of whose lobes is exactly like a tongue and chin which are so unstable as to be in a state of continual

* Gard. Chron. XVIII. (1882), pp. 172, 365.

oscillation. The flowers are arranged in a circle, and all look outwards; so that on whatever side the umbel is regarded, it still presents to the eye the same row of grinning faces and wagging chins."

C. cornutum.

"Pseudo-bulbs ovate-oblong, more or less sheathed with large membranous scales. Leaves oblong, obtuse, leathery, 8—10 inches long, imperfectly petiolate. Scapes slender, erect, bearing at the top a radiating umbel of dark purple and white flowers. Dorsal sepal small, ovate, concave, with ciliate margin; lateral two connate, broadly linear, more than 2 inches long; petals similar to the dorsal sepal but smaller and more ciliated; lip ovate, recurved, and bent upwards against the column."—*Botanical Magazine*.

Cirrhopetalum cornutum, Lindl. in Bot. Reg. 1838, misc. 138. *Bot. Mag.* t. 4753.

A pretty species, native of the Khasia Hills, whence it was introduced to the Royal Gardens at Kew, through Simons, in 1852—3. The structure of the flowers, which are arranged in a radiating umbel of about eight, is very curious.

C. Cumingii.

Pseudo-bulbs oval, angulate. Leaves elliptic-oblong, 3—4 inches long. Scapes slender, twice as long as the leaves. Umbel regular, consisting of 9—12 purple flowers. Dorsal sepal small, ovate, concave, fringed with long glandular hairs; lateral sepals linear-oblong, 1 inch long; petals like the dorsal sepal but smaller; lip fleshy, tongue-shaped, with two erect plates on the disc.

Cirrhopetalum Cumingii, Lindl. in Bot. Reg. 1843, sub. t. 49. *Bot. Mag.* t. 4996.

Discovered by Cuming, in 1840, in the Philippine Islands, and sent by him to Messrs. Loddiges, in whose nursery it flowered in the following year. It is one of the prettiest of the genus.

C. Macraei.

"Pseudo-bulbs ovate, scarcely as large as nutmegs. Leaves oblong, acute, tapering into a rather long foot-stalk. Scapes slender, longer than the leaves, bearing at their extremity a raceme—scarcely at all umbellate—of about six flowers. Dorsal sepal small, broadly lanceolate, with a setaceous point; lateral sepals long, linear-lanceolate, acuminate, yellow streaked with red; petals ovate, acuminate, brown-purple; lip fleshy, ovate, acuminate, recurved. Column short with two wings, and terminating upwards in two long teeth."—*Botanical Magazine*.

Cirrhopetalum Macraei, Lindl. Gen. et. Sp. Orch. p. 59 (1831). *Bot. Mag.* t. 4422.

Discovered in Ceylon by Mr. Macrae, after whom it was named, and first sent to the Royal Gardens at Kew, by Dr. Gardner,

Director of the Botanic Garden at Peradeniya. Although not so striking as the preceding species, it is noticed here on account of it being occasionally imported along with other Ceylon orchids.

C. Medusæ.

Pseudo-bulbs ovoid, ribbed. Leaves elliptic-oblong, 6–8 inches long. Scapes as long as the leaves, clothed with large sheathing bracts. Umbel many-flowered. Flowers small, cream colour spotted with yellow; dorsal sepal lanceolate at base; lateral sepals tapering into long pendent tails, 4–5 inches long; petals and lip minute, subulate, with a broad base.

Cirrhopetalum Medusæ, Lindl. in *Bot. Reg.* 1842, t. 12. *Bot. Mag.* t. 4977.

Native of Singapore, whence it was introduced by Messrs. Loddiges, in 1841. The aspect presented by the dense cluster of flowers at the apex of the scape is one of the strangest even amongst orchids. "The flowers are small, but so numerous, and the lateral sepals are so very much lengthened as to give the spike the appearance of a head with very long dishevelled hair, which induced Dr. Lindley to call the plant the Medusa's Head orchid."*

C. ornatissimum.

Pseudo-bulbs ovoid, 1–1½ inches long. Leaves oblong-obtuse, 4–5 inches long. Scape short, terminating in a semi-umbel of 4–5 flowers, pale yellow streaked and stained with purple. Dorsal sepal oval-oblong, fringed at the apex; lateral sepals linear-lanceolate, prolonged into slender tails; petals like the dorsal sepal but more pointed; lip with a curved claw, oblong, reflexed, deep purple.

Cirrhopetalum ornatissimum, Rehb. in *Gard. Chron.* XVIII. (1882), p. 424.

A species with bright-coloured flowers about the size of those of *Cirrhopetalum Thouarsii*, that has been in cultivation since 1879, and is now in several orchid collections. Native country not recorded.

C. picturatum.

Pseudo-bulbs tufted, ovoid, 2–2½ inches long, angulate. Leaves linear-oblong, 3–6 inches, petiolate, emarginate. Scape longer than the leaves, pale green speckled with purple, with a pale yellow-green sheath speckled with red at each joint. Umbel 10 or more flowered. Flowers 2 inches long and upwards; upper sepal erect, obtuse, with a terminal purple-knobbed thread as long as itself, dull green spotted with red; lateral sepals linear, straight, pale dull green; petals very small, rounded,

* The Medusa of mythology was one of three frightful maidens called Gorgones. The hair of her head was changed by Minerva into snakes, by which she became so dreadful an object, that every one who looked on her was turned into stone.

ovate, awned at the top, coloured like the dorsal sepal; lip tongue-shaped, obtuse, recurved, blood-red. Column short, without auricles." —*Botanical Magazine*.

Cirrhopetalum picturatum, Lindl. in Bot. Reg. 1840, misc. 100. *Bot. Mag.* t. 6802. Originally introduced by Messrs. Loddiges about the year 1840, and since collected by the Rev. C. Parish and others in Moulmein and Lower Burmah. It is one of the most distinct of the genus.

C. Thouarsii.

Pseudo-bulbs ovoid, angulate, about the size of a small walnut. Leaves elliptic-oblong, 4—5 inches long, usually recurved at the apex. Scapes slender, erect, 7—9 inches long, sheathed with brownish scales



Cirrhopetalum Thouarsii.
(Copied from the *Botanical Magazine*.)

at the joints, and terminating in a one-sided umbel of 10 - 15 flowers; Dorsal sepal ovate, cuspidate, tawny yellow spotted with purple warts; lateral sepals lanceolate-acute, pale tawny yellow stained with claret-

red; petals minute, ovate-lanceolate, contracted at the apex to a thread-like tail, pale yellow spotted with purple; lip fleshy, oblong, reflexed.

Cirrhopetalum Thouarsii, Lindl. Gen. et Sp. Orch. p. 58 (1831). *Bot. Reg.* 1833, t. 11. *Bot. Mag.* t. 4237. *Bulbophyllum longiflorum*, Thou. Orch. Afr. t. 98.

A very curious species that appears to be exclusively an insular one, and to be indigenous to islands widely remote from each other, for it has been reported from Madagascar, Java, Luzon (Philippines), and Otaheite (Society Islands). It is said to have been introduced from the last-named in 1836. It is the typical species upon which the genus is founded, and is dedicated to its discoverer, Aubert Du Petit Thouars (1756—1831), a French botanist, and one of the first who studied the vegetation of the islands off the east coast of Africa, which a ten years' residence in the Ile de France (Mauritius) enabled him to pursue with considerable success.

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4°

A MANUAL

OF

ORCHIDACEOUS PLANTS

CULTIVATED UNDER GLASS IN GREAT BRITAIN.

PART VI.

CŒLOGYNE, EPIDENDRUM,

SPATHOGLOTTIS, PHAIUS, THUNIA, CHYSIS, PLEIONE,
CALANTHE, DIACRIUM, NANODES, ETC., ETC.

JAMES VEITCH & SONS,

ROYAL EXOTIC NURSERY, 544, KING'S ROAD, CHELSEA, S.W.

1890.

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PRELIMINARY NOTICE.

THIS Manual is being compiled to supply amateurs and cultivators of exotic Orchids with a fuller account of the principal genera, species and varieties cultivated under glass, than is contained in the Manuals hitherto in use.

The rapid extension of Orchid culture during the last quarter of a century, resulting from the increased taste for and appreciation of this beautiful and interesting order of plants, has, in our opinion, created the *desideratum* which we are now attempting to supply. The prominent place, too, occupied by Orchids in the columns of the Horticultural Press, and the surprising amount of practical and varied information respecting them disseminated through its agency, has also stimulated the desire to obtain all the leading facts in a condensed form, to which easy reference may at any time be made.

So numerous are the species and varieties of Orchids at present in cultivation, and to which additions are constantly being made by new discoveries and by artificial hybridisation, that the labour attending the compilation of a Manual sufficiently comprehensive to meet the wants of cultivators must necessarily demand much time. Moreover, the present unsatisfactory state of Orchidology, especially in its horticultural aspect and its complicated and unscientific nomenclature, have rendered the compilation of such a Manual within a stated time almost an impossibility.

Under these circumstances, and yielding to the solicitations of patrons and friends, we have decided upon issuing the work in parts, each part containing a monograph of the cultivated species and varieties of one of the most important genera, or of a group of genera.

Little explanation of the plan of the work is here needed; the parts as issued must speak for themselves. We have only to state that in the scientific classification and sequence of the genera we have followed, with but trifling deviations, the arrangement of Bentham and Hooker as elaborated in their *Genera Plantarum*, the most profound and, at the same time, the most intelligible exposition of the Orchideæ extant. In the nomenclature of the species, we have adhered to the Laws of Botanical nomenclature adopted by the International Botanical Congress, held at Paris in August, 1867.

In the description of the species, we have been compelled to use occasionally a few technical terms to avoid cumbrous circumlocutions; at the conclusion of the work we propose giving a glossary of the terms so used. In the cultural notes we have quoted temperatures in the Centigrade scale with the equivalent Fahrenheit readings, in the hope that the far more rational scale, now almost universally adopted in scientific investigations, may also come into use in horticulture. The literary references in italics indicate coloured plates of the species or variety described.

SUB-TRIBE ERIEÆ.

*Inflorescence lateral, pseudo-terminal, or from the rhizome distinct from the leaf-bearing pseudo-bulbs. Column almost always extended into a foot. Pollinia eight, four in each cell.**

CCELIA.

Lindl. Gen. et Sp. Orch. p. 36 (1831). Benth. et Hook. Gen. Plant. III. p. 508 (1883).

Cœlia includes four or five species inhabiting the West Indies, Mexico, and Central America, of which three have been introduced into European gardens. The genus was founded by Dr. Lindley upon a drawing of *Cœlia Baueriana* made by the distinguished botanical artist, Francis Bauer, who, however, "represented the pollen masses as being four in number and concavo-convex, so that by lying in pairs, side by side, each pair formed a hollow body, narrower at back than in front, a circumstance that suggested the name of the genus (from κοῖλος, hollow). When fresh specimens were subsequently examined, it was found that no such structure as that represented by Bauer exists; on the contrary, the pollinia are eight in number, placed in two series of double pairs, and of the supposed hollowing out no trace is discoverable."† The name *Cœlia*, nevertheless, was retained by Lindley and adopted by his successors.

The most obvious generic characters are:—The long narrow, more or less folded and veined leaves; the densely racemose scapes (three-flowered only in *Cœlia bella*) which spring from the base of the latest formed pseudo-bulbs; the column produced into a short foot, to which the two lateral sepals are adnate at their base; and the three-winged capsule.

Cultural Note.—*Cœlia bella* requires the average annual temperature of the Cattleya house; a moist atmosphere and a liberal supply of water during its season of growth are requisite to insure the pseudo-bulbs

* *Cœlia*, *Pachystoma*, *Ipsea*, and *Spathoglottis* form part of this sub-tribe, of which *Eria* supplies the type, a genus including upwards of eighty species, none of which properly fall within the scope of the present work. We may, however, mention that *Eria obesa*, *E. cinnabarinæ*, *E. floribunda*, and two or three others are among the species sometimes met with in private collections.

† Bot. Reg. 1842, sub. t. 36,

attaining their full size, and the flowering of the plant in the following season. *C. macrostachya* requires the same cultural treatment as *Lycaste Skinneri*, *Odontoglossum Insleayi*, and other well-known orchids inhabiting the elevated regions of Central America. *C. Baueriana* requires a higher temperature and a more humid atmosphere than the two first-mentioned species.

Cœlia Baueriana.

Pseudo-bulbs clustered, ovoid or sub-globose, $1\frac{1}{2}$ —2 inches thick, triphyllous. Leaves linear, acute, 12—18 inches long, narrowed below into sheathing petioles, deep green with 2—4 pale veins. Scapes stoutish, 4—5 inches long, invested below by 3—5 large lanceolate, acuminate, greenish brown sheaths, densely racemose along the upper half. Flowers with all the segments concave, fragrant, white, on short pedicels, at the base of which is a linear greenish brown bract longer than the ovary and perianth; ovary three-angled, prominently winged at the angles; sepals ovate-lanceolate; petals broadly obovate-oblong; lip shorter than the other segments, with a broad saccate yellow claw and triangular blade. Column very short.

Cœlia Baueriana, Lindl. Gen. et Sp. Orch. p. 36 (1831). *Bot. Reg.* 1842, t. 38 (*Bauerana*). *Epidendrum tripterum*, Smith Ic. pict. t. 14. *Cymbidium tripterum*, Swartz, N. Act. Ups. VI. p. 70.

Cœlia Baueriana is somewhat widely distributed over the West India Islands and parts of Mexico. It became known to science towards the end of the last century, first as *Epidendrum tripterum*, then as *Cymbidium tripterum*, till removed from the last-named genus by Dr. Lindley, on account of the totally different structure of its flowers. We find no record of its first introduction into British gardens, but it was in cultivation prior to 1842, in which year it was figured in the *Botanical Register*. Dr. Lindley compared it with our native Lily of the Valley, for "although white and inconspicuous, it is so sweet that it must take precedence of most of its race; no hawthorn hedge is more fragrant than a bed of this *Cœlia*." We are indebted to Mr. F. G. Tautz, of Studley House, Hammersmith, for materials for description.

C. bella.

Pseudo-bulbs globose, smooth, $1\frac{1}{2}$ —2 inches in diameter. Leaves 3—4 from the apex of each pseudo-bulb, elongate, ensiform, acuminate, 15—20 inches long. Scapes 3—5 inches high, sheathed with brown imbricating acute boat-shaped bracts, 3—5 flowered. Flowers fragrant, 2 inches long, tubular below, funnel-shaped above; sepals and petals similar, oblong-obtuse, white, the sepals tipped with rose-purple; lip

obscurely three-lobed, the side lobes linear-oblong, erect, canary-yellow, the middle lobe tongue-shaped, reflexed. Column white, triquetral, three-toothed at the apex.

Coclia bella, Rchb. Walp. Ann. VI. p. 218 (1861). *Bot. Mag.* t. 6628. Williams' *Orch. Abb.* II. t. 51. *Bifrenaria bella*, Lemaire, *Gard. Fleur.* t. 325 (1853). *Bothriochilus bellus*, Lemaire, Illus. hort. III. (1856), p. 30.

The origin of this plant is obscure. According to Lemaire (*L' Illustration Horticole*, loc. cit.) it was sent about the year 1852 to M. Verschaffelt's horticultural establishment at Ghent, by M. Devos, from Sancta Catherina in Southern Brazil. But Sir J. D. Hooker has pointed out (*Botanical Magazine*, sub. t. 6628), that the plant is without doubt, like its congeners, a native of Central America, as there is a specimen of it in Lindley's herbarium, collected by Mr. G. Ure Skinner in Guatemala. It is by far the handsomest species in the genus.

C. macrostachya.

Pseudo-bulbs globose, 2—3 inches in diameter, triphyllous. Leaves lanceolate, acuminate, plicate, 12—15 inches long. Scapes as long as the leaves, the basal portion clothed with large, ovate acute brownish sheaths, the upper two-thirds a crowded spike of partially expanded rose-coloured flowers, the colour deeper at the base and on the spur of the lip, and paler on the petals. Bracts linear, acuminate, longer than the flowers. Sepals oblong, acute; petals obovate-oblong; lip oblong, reflexed, terminating below in a bi-gibbous spur. Column semi-terete, whitish.

Coclia macrostachya, Lindl. in Benth. Pl. Hartw. p. 92 (1842). Id. Bot. Reg. 1842, sub. t. 36. *Bot. Mag.* t. 4712. Van Houtte's *Fl. des Serres*, t. 900 (1854), (copied from *Bot. Mag.*). *Rev. hort.* 1878, p. 210.

First sent by Hartweg from the Hacienda de la Llaguna, in Mexico, in 1841, to the Horticultural Society's Garden at Chiswick, and occasionally imported since with other Mexican orchids. Its flowering season is August—September.

PACHYSTOMA.

Blume, Bijdr. p. 376 (1825). Benth. et Hook. Gen. Plant. III. p. 511 (1833).

Although founded by the Dutch botanist Blume, on a terrestrial orchid (*Pachystoma pubescens*) which he discovered in Java in the early part of the present century, the genus Pachystoma was scarcely known to horticulture even by name till the beautiful species described below—which was sent to us in 1878—was referred to it by

Reichenbach, and subsequently accepted by Bentham, who would, however, have preferred bringing it under *Ipsea*.* The true *Pachystomas*, about seven or eight species, are leafless plants with inconspicuous flowers of a totally different habit from the African plant here described, and are scattered over parts of India and the Malay Archipelago, but none of them possess any horticultural interest.

Pachystoma Thomsonianum.

Pseudo-bulbs orbicular, much like those of a *Pleione*, placed at short intervals on a creeping rhizome, mono-diphyllous. Leaves lanceolate, acuminate, 6—8 inches long. Peduncles slender, as long as the leaves, one or two from the base of each pseudo-bulb, 2—4 flowered. Flowers 3 inches across; sepals and petals white, lanceolate, acute, the dorsal sepal the broadest, the lateral two narrower and falcate; lip three-lobed, the lateral lobes erect, sub-quadrata, greenish, densely spotted with deep purple on the inner side; middle lobe triangular, elongated, tapering to a recurved point, and traversed by five raised longitudinal purple lines which gradually coalesce towards the apex. Column arched, semiterete, green spotted with red.

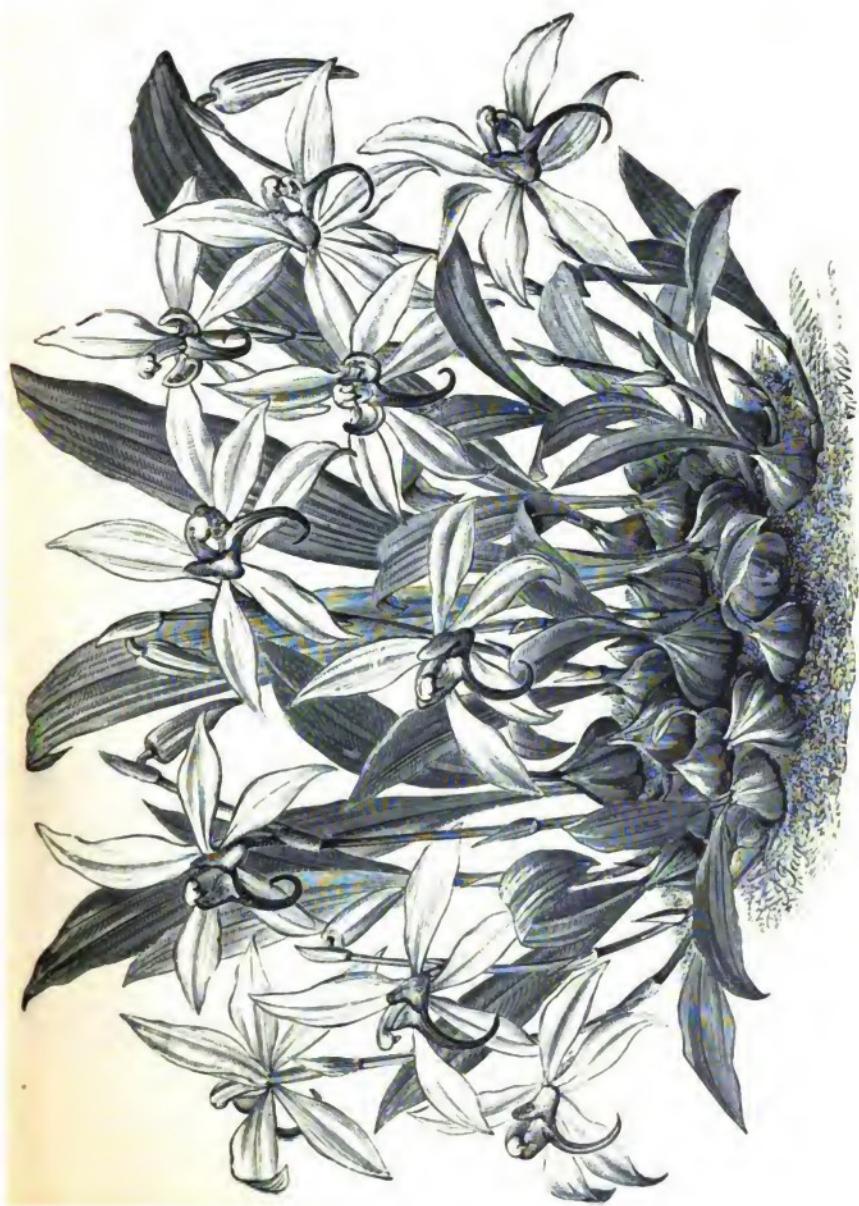
Pachystoma Thomsonianum, Rehb. in *Gard. Chron.* XII. (1879), pp. 582 and 625, icon. xyl. Id. *Xen. Orch.* III. p. 35, t. 213. *Bot. Mag.* t. 6471. *Williams' Orch. Abb.* V. t. 220.

A native of the mountains of Old Calabar, in West Africa, at a moderate elevation, where it was discovered by Kalbreyer growing on the trunks of trees, and at his request named after Mr. Thomson, for a long time an earnest missionary in that unhealthy region. The species is, as Sir J. D. Hooker justly remarks, "a very lovely one; its graceful form and the purity and brilliancy of its white, and the vividness of its purple, render it one of the most beautiful orchids of its type and habit, which remind one a good deal of some *Cælogynes*". (Pleiones).†

Cultural Note.—Inhabiting one of the hottest parts of the globe, its geographical position indicates its chief cultural requirements, viz., a constantly warm and moist atmosphere, such as is maintained in the *Phalænopsis* house. A suitable provision should be made for its sub-terrestrial, creeping habit, such as a shallow pan or teak basket that can be conveniently suspended near the roof-glass of the house.

* *Jour. of Linn. Soc.* XVIII. p. 304.

† *Bot. Mag.* sub. t. 6471.



Pachystoma Thomsonianum.



Spathoglottis aurea.
From the *Gardener's Chronicle*.)

IPSEA.

Lindl. Gen. et Sp. Orch. p. 124 (1831).

Ipsea is made sectional under *Pachystoma* by Bentham, with the remark that it would perhaps be better to restore it to generic rank. We need therefore offer no apology for doing so, especially as the species described below is clearly distinguishable from the typical *Pachystomas* by its leaf-bearing pseudo-bulbs and large showy flowers. *Pachystoma Thomsonianum* should, according to the same authority, be a second species of *Ipsea*,* but there are structural differences observable in the flower, especially in the pollinia and the labellum, that render it very distinct from the Ceylon plant; it is, to our mind, so far as at present known, a monotypic form that should have separate generic rank.

Ipsea speciosa.

Pseudo-bulbs or tuberous rhizomes, sub-globose like corms, from the conical tops of which are produced two but sometimes only one lanceolate leaf, 5—9 inches long, tapering below into a slender petiole. Scapes slender, erect, 12—18 inches high, with 2—3 joints, at each of which is a spathaceous bract, 1—2 flowered. Flowers 2—3 inches in diameter, canary-yellow with some red lines on the disk of the lip; sepals oblong, obtuse, the lateral two connate at the base of the column, forming a small obtuse spur; petals obovate-oblong, smaller than the sepals; lip three-lobed, the lateral lobes triangular, ascending, the intermediate lobe broadly obovate, recurved with five wavy keels on the disc, of which the middle one is the longest. Column clavate.

Ipsea speciosa, Lindl. Gen. et Sp. Orch. p. 124 (1831). Thwaites, Pl. zeyl. p. 301. Bot. Mag. t. 5701. *The Garden*, XXII. (1882), t. 351. Gard. Chron. XVIII. (1882), p. 500. *Pachystoma speciosum*, Rchb. in Bonpl. III. (1855), p. 250.

Discovered in the early part of the present century by McRae, on the mountains in the south of Ceylon, where it is "not uncommon amongst long grass on exposed slopes, at an elevation of 4,000—5,000 feet." It was introduced to the Royal Gardens at Kew, in 1866, by Mr. Thwaites, at that time Director of the Botanic Garden at Peradenia.

Cultural Note.—The cultural treatment of *Ipsea speciosa* is the same as that of the *Pleiones* (see *postea*), but with the average temperature somewhat higher.

* Ei bene adjunctum videtur *Pachystoma Thomsonianum*. Gen. Plant. III. p. 511. See also Jour. Linn. Soc. XVIII. p. 304.

SPATHOGLOTTIS.

Blume Bijdr. p. 400 (1825). Benth. et Hook. Gen. Plant. III. p. 511 (1853).

Closely allied to the two preceding genera, and separated from them chiefly on account of the column not being produced at the base, is Spathoglottis, including about ten species inhabiting southern China, India, the Malay Archipelago, and some of the islands of the Pacific Ocean. They are terrestrial orchids, with mono-diphyllous pseudo-bulbs, elongated prominently veined leaves, and racemose scapes borne on the rhizome distinct from the pseudo-bulbs. Several of the species have been in cultivation during the past half century, but like other tropical terrestrial orchids, most of them have failed to find favour with amateurs, with the exception of *Spathoglottis aurea* and the recently introduced *S. Vieillardii*. The other three species described in the following pages are still occasionally met with in collections.

The generic name Spathoglottis is derived from $\sigma\pi\alpha\theta\eta$ (spathe), "a spathe," originally the name given to the large bract enclosing the inflorescence of the Palm; and $\gamma\lambda\omega\sigma\sigma\alpha$ (glossa or glotta), "the tongue," in orchidology the labellum or lip.

Cultural Note.—The native localities of the species indicate the approximate temperature in which they should be cultivated; thus, *Spathoglottis aurea* and *S. Lobbii*, occurring within the equatorial zone, should be grown in the East India house. *S. Vieillardii* and *S. Petri*, although both tropical species, grow wild on mountains at a considerable elevation, whence a somewhat lower or intermediate temperature is sufficient for them; *S. Fortunei*, from Hongkong, may also be associated with them. On account of the terrestrial habit of the Spathoglottis, it is usual, as in the case of the Pleiones, to mix a small quantity of leaf-mould or loam and a little silver sand with the compost of peat and chopped sphagnum in which they are potted, a drainage of clean crocks being allowed in proportion to the depth of the pots or pans used. The watering must be regulated according to the season, freely given when the plants are in active growth, diminished and even withheld for a time when at rest during the winter season.

Spathoglottis aurea.

Leaves plaited, ligulate-lanceolate, acuminate, 30—40 inches long. Scapes erect, as long as or longer than the leaves, purplish below, green along the rachis, many-flowered. Bracts numerous, spathulate, concave. Flowers 3 inches in diameter; sepals elliptic-oblong obtuse, bright canary-yellow, keeled and streaked with dull orange-red behind; petals generally larger than the sepals, obovate-oblong, but sometimes

similar and equal to them, bright canary-yellow on both sides; lip shorter and smaller than the other segments, three-lobed, the side lobes oblong, roundish and dilated at the apex, incurved, bright yellow densely spotted with red on the basal half; front lobe fleshy, linear spathulate, obtuse, with two broad subulate auricles at the base, bright yellow spotted with red. Crest bi-lamellate, the lamellæ divergent.

Spathoglottis aurea, Lindl. in Jour. of Hort. Soc. Lond. 1850, p. 34. Rehb. in Gard. Chron. IV. s. 3 (1888), p. 92, icon. xyl. S. Kimballiana, Hort. Sander.

Introduced by us in 1849 from Mount Ophir in Malacca, where it was detected by Thomas Lobb growing near *Nepenthes sanguinea* and *Rhododendron jasminiflorum*. Only a very few plants reached England alive, and these gradually died out after flowering one or two seasons. Nothing more was seen or heard of it in a living state till 1886, when it was sold at Stevens' Rooms by its importers, Messrs. Sander and Co., of St. Albans, who had received it from their collector Förstermann.

Spathoglottis aurea is a plant of considerable interest both to botanists and to horticulturists; its large spoon-like caudine bracts are peculiar to it and strongly mark its specific character, while its flowers are the largest and most handsomely coloured in the genus.

S. Fortunei.

Leaves form a tuberous rhizome, usually in pairs, linear-lanceolate, 9–15 inches long. Scapes shorter than the leaves, slender, pubescent, bearing a terminal 5–9 flowered lax raceme. Flowers yellow with the side lobes of the lip streaked and spotted with red; sepals oval-oblong; petals broader, oval; lateral lobes of lip oblong, erect; middle lobe obovate, emarginate; crest consisting of two divergent fleshy lobes, and a central raised line reaching nearly to the apex of the lip. Column winged, triquetral above, concave below.

Spathoglottis Fortunei, Lindl. Bot. Reg. 1845, t. 19. Benth. Fl. Hongkong, p. 355. *Pachystoma Fortunei*, Rehb. Walp. Ann. VI. p. 464 (1861).

First sent by Fortune in 1844 from Hongkong to the Horticultural Society of London, in whose garden at Chiswick it flowered in January in the following year. It is abundant in the island, and it has been also gathered in China on the mountains adjacent to the coast opposite Hongkong.

S. Lobbii.

Pseudo-bulbs of irregular form, compressed. Leaves broadly lanceolate, acute, 7–10 nerved. Scapes slender, 18–24 inches high, pale green and pubescent below, purplish above, 4–6 flowered. Flowers $1\frac{1}{2}$ –2

inches across, bright yellow with some lines of red spots on the lateral sepals and at the base of the lip; sepals and petals similar, oval-oblong, acute; lip three-lobed, the side lobes linear-oblong erect, the intermediate lobe obovate, emarginate, contracted below to a narrow claw on which is a bi-lamellate callus. Column arched, broad at apex.

Spathoglottis Lobbii, Rehb. in Walp. Ann. VI. p. 455 (1861). Id. in Gard. Chron. V. (1876), p. 534. *The Garden*, XXII. (1882), t. 351.

A native of Labuan, in Borneo, where it grows in red sandy earth on the cliffs below the Civil Hospital Flat, its roots being protected by grass and other herbage, but otherwise exposed to a tropical sun.* It also occurs on the slopes of the mountains of Sarawak at 1,200—1,500 feet elevation. It was originally detected by the collector whose name it bears, but who failed to send living specimens to Europe; it seems to have been first introduced by Messrs. Rollisson about the year 1875.

S. Petri.

Pseudo-bulbs sub-globose, $1\frac{1}{2}$ inches in diameter. Leaves narrowly lanceolate, acuminate, 12—18 inches long. Scapes a little longer than the leaves, 9—12 flowered. Flowers $1\frac{1}{2}$ inches in diameter, pale rosy lilac on purplish pedicels, at the base of which is a small ovate deciduous bract; sepals ovate-oblong; petals broader, sub-orbicular, apiculate; lip shorter than the other segments, distinctly three-lobed, the side lobes oblong, incurved, purple on the inner side; front lobe transversely oblong, apiculate; callus heart-shaped, yellow spotted with red. Column sub-clavate, bent, purplish lilac.

Spathoglottis Petri, Rehb. in Gard. Chron. VIII. (1877), p. 392. *Bot. Mag.* t. 6354.

Discovered by Mr. Peter Veitch in the Feejee Islands, in 1876, and sent by him to our Chelsea nursery, where it flowered for the first time in the following year. The deciduous bracts are a marked characteristic of this species, as these organs are persistent in the other species even long after the ripening of the fruit.†

S. Vieillardii.

Pseudo-bulbs ovoid, $2\frac{1}{2}$ inches long. Leaves large for the genus, 30—40 inches long, lanceolate, acuminate, plicate and closely ribbed, cuneate below, and passing into a short petiole, but sometimes sessile. Scape erect, 18—24 inches high, racemose above, many flowered, the flowers expanding in succession from below upwards, five to ten being

* F. W. B. in *The Garden*, XXII. (1882), p. 188.

† *Bot. Mag.* sub t. 6354.

in perfection at one time; pedicels (including ovary), 2—2½ inches long, pale purple, at the base of which is a conspicuous oval, acute, concave, cream-coloured bract. Flowers 2 inches across; sepals and petals white, the sepals elliptic-oblong, acute, concave, keeled behind, the petals similar but larger, slightly undulate, not keeled; lip three-lobed, the side lobes oblong-obtuse, turned upwards and inwards, pale red-brown; the middle lobe obovate, emarginate with a long linear claw at the base of which is a large, bi-lobate, bright yellow callus, below which are two depressed whitish lobules dotted with red. Column clavate, arched, terete above, white sometimes tinted with rose.

Spathoglottis Vieillardii, Rchb. in *Liunæa*, XLI. p. 85 (1877). *Bot. Mag.* t. 7013. S. Augustorum, Rchb. in *Lindenia*, I. t. 25 (1886). *Gard. Chron.* XXV. (1886), p. 335.

First discovered by MacGillivray, naturalist to Captain Denham's voyage to the Pacific Ocean, in 1853, in the Isle of Pines, one of the New Caledonian group of islands, and subsequently gathered in New Caledonia by the French botanist whose name it commemorates, and from whose specimens it was described by the late Professor Reichenbach in the serial quoted above.* It was introduced into European gardens by MM. Auguste Linden and Auguste de Ronne in 1885—86, while collecting plants for the Compagnie Continentale d'Horticulture de Gand from the Sunda Isles (?) it is said, but a locality so vaguely stated is misleading, and from its remoteness from New Caledonia, the known habitat of the species, its presence there was hardly to be anticipated. From the published account of one of these travellers in the *Gardeners' Chronicle* loc. cit., we gather that the plant occurs on a mountain, at an elevation of 1,200—1,300 feet at the bottom of a gully surrounded with rocks, where it occupies shaded and damp retreats.

Bot. Mag. sub. t. 7013.

SUB-TRIBE BLETIEÆ.

Stems usually pseudo-bulbous at the base; leaves large and folded with prominent longitudinal nerves. Inflorescence (with few exceptions) on separate leafless scapes.

PHAIUS.

Lour. Fl. Coch. Ch. II. p. 529 (1790). Benth. et Hook. Gen. Plant. III. p. 512 (1833). Phajus, Lindl. Gen. et Sp. Orch. p. 126 (1831).

A genus of robust sub-terrestrial orchids, including about twenty species that are spread over tropical Asia, parts of Africa, Madagascar, Australia, some of the islands of the Pacific Ocean, the Malay Archipelago, and extending northwards into China and Japan, occurring generally in low-lying swampy places, but in a few cases at a considerable elevation, often in shade, but sometimes fully exposed to the sun's rays. Mr. Bentham, following the Dutch botanist Blume, has adopted four sectional divisions of the genus, of which two only include species of horticultural interest, viz., the true Phaius (*Genuini*) and *Thunia*. The last named section was raised to generic rank by Reichenbach, on account of the totally different habit of the included species, the different form of the inflorescence, and some structural differences observable in the flowers, notably the fringed lamellæ of the lip. As the *Thunias* require a cultural treatment very different from *Phaius*, they must necessarily be regarded as horticulturally distinct; we have therefore followed Reichenbach in keeping *Thunia* separate from *Phaius*.

The essential characters of *Phaius* are:—Leaves ample, 4—6 in number from a thickened rhizome or pseudo-bulb; scapes racemose, tall, leafless, many sheathed; sepals and petals free, similar and sub-equal; labellum spurred at the base. Column wingless, pollinia eight, in two bundles of four each.

The name *Phaius* (*φαῖος*) is the Greek word for swarthy, in reference to the prevailing yellow-brown tints of the flowers.

Cultural Note.—The plants should be re-potted in the spring when commencing their new growth in a compost of fibrous loam, and a small quantity of rough peat and chopped sphagnum. Drainage to about one-half the depth of the pot should be secured by means of broken crocks. Liberal and frequent waterings must be given during the season of active growth, and occasionally a little weak manure

water may be used, but during the season of rest only sufficient water should be given to keep the compost moist. The temperature of the intermediate house is sufficient, that is to say, a range of about 13°—20° C. (55°—70° F.) by fire heat, according to the season of the year. The plants should not be exposed to direct sunlight during the summer months; it is not unusual to place them in a shady position in the East India house during active growth, or even in an ordinary stove. All the species of *Phaius* described below usually flower in March and April, with the exception of *Phaius tuberosus*, which generally flowers earlier.

Phaius grandifolius.

Pseudo-bulbs ovate, as large as a large hyacinth bulb, and sheathed by the imbricating bases of the fallen leaves. Leaves 4—6, oblong-lanceolate, acute, petiolate, 30—40 inches long. Scapes stout, 3—4 feet high, terminating in a 12—18 flowered raceme. Flowers 3—4 inches across; sepals and petals oblong-lanceolate, acute, distinctly nerved, yellow-brown on the inner side, silvery white behind; lip broadly obovate, convolute into a tube to three-fourths of its length, whitish without, pale yellow-brown bordered with rose-purple on the inner side; anterior part open, rose-purple bordered with white; disk yellow streaked with red-purple; spur short, curved.

Phaius grandifolius, Lour. *Fl. Coch.* Ch. II. p. 529 (1790). *Bot. Reg.* 1839, misc. 40. *Hook. Cent. Orch.* t. 37. Van Houtte's *Fl. des Serres*, VII. t. 738. Benth. *Fl. austral.* VI. p. 304. *P. australis*, *P. leucophæus*, *P. Carronii*, *F. Muel*, *Bletia Tankervillee*. R. Br. in *Hort. Kew.* ed. 2, vol. V. p. 205. *Bot. Mag.* t. 1924. *Limodorum Tankervilliae*, Ait. *Hort. Kew.* ed. I. vol. III. p. 302, t. 12. And many others.

var.—*Blumei*.

Sepals and petals oblong, acute, broader than in the type, deep buff-yellow faintly mottled with red.*

P. grandifolius Blumei, supra. *P. Blumei*, Lindl. *Gen. et Sp. Orch.* p. 127. *Blume, Orch. Ind. Archipel.* t. 1. *Regel's Gartenl.* 1865, t. 464.

One of the earliest tropical orchids introduced into British gardens, it having been brought from China about the year 1778 by Dr. John Fothergill; it is also a native of the hot valleys of the lower Himalayan zone, Cochin China, and various parts of eastern Australia, especially in the neighbourhood of Moreton Bay, whence it was sent to the Royal Gardens at Kew, by Allan Cunningham,

* The above is the only character we find in *Phaius Blumei* in cultivation, by which it may be distinguished from *P. grandifolius*. Moreover we have had forms in our houses so nearly intermediate between these, that they might with equal propriety be referred to either. An Australian representative of the variety, figured in the *Botanical Magazine*, t. 6032, under the name of *P. Blumei Bernaysii*, has primrose-yellow flowers, but it is of little value as a horticultural plant on account of the flowers being often self-fertilising before they expand, and thence lasting but a short time in perfection.

in 1824. Over so extensive a region the plant is observed to vary somewhat in habit and the flowers considerably in colour; it has received many names in consequence. The form known as *Phaius Blumei*, first detected on Mount Salak, in Java, by the botanist whose name it bears, is now regarded as a variety of the common type, from which it differs only in the character described above. *P. grandifolius* was introduced to Jamaica by Hinton East in 1787, where it has become thoroughly naturalised, and is now found growing freely in the bush, and sometimes even in the forest, on the hills at 2,000—4,000 feet elevation.* *P. grandifolius* is one of those useful orchids that may be cultivated in any ordinary stove or intermediate house, and when in flower it may even be used for the decoration of apartments from which frost is carefully excluded. Its flowering season is from February to April.

P. Humboldtii.

Pseudo-bulbs sub-globose, about $1\frac{1}{2}$ inches in diameter, with 2—3 rings where the leaves have fallen. Leaves broadly lanceolate, acuminate, plicate, 15—20 or more inches long, narrowed below into channelled and winged foot-stalks. Scapes as long as, or longer than, the leaves, racemose, 7—10 or more flowered. Flowers 2 inches in diameter; sepals and petals similar and sub-equal, broadly obovate-elliptic, light rose-purple suffused with white; lip broadly panduriform with crisped and undulate margin, the basal lobes notched at the edge, reddish brown passing into crimson at the margin; the anterior lobe rose-purple with a whitish centre, on which are two large bright yellow teeth pointing inwards. Column slender, bent like a swan's neck, terete and greenish above, grooved below the small stigmatic cavity.

Phaius Humboldtii, Rehb. in Gard. Chron. XIV. (1880), p. 812. Id. XXVI. (1886), p. 294. Id. 173 icon. xyl. Sander's *Reichenbachia*, I. t. 17.

Introduced by M. Léon Humboldt, a French naturalist and traveller, who had discovered it during an excursion into the interior of Madagascar, in 1879—80. He sent at the same time the beautiful *Phaius tuberosus*, so that to M. Humboldt is due the merit of adding to the orchid collections of Europe two of the most remarkable species of the genus yet known.

P. maculatus.

Pseudo-bulbs clustered, ovoid, 4—5 inches long, and $2-2\frac{1}{2}$ inches thick, produced at the apex into a leafy stem 15—20 inches long,

* D. Morris in Gard. Chron. XXIV. (1885), p. 140. We have since had it offered to us by an amateur collector of orchids in Jamaica.



Phaius Humboldtii.

(Drawn at Tring Park, the seat of the Right Hon. Lord Rothschild.)



Phaius tuberosus.
(Drawn in the garden of Sir Trevor Lawrence, Bart., M.P., at Burford Lodge, Dorking.)

bearing 5—7 oblong-lanceolate leaves as long as the stem, and spotted with pale yellow. Scapes 2—3 feet high, racemose along the distal half, many flowered. Flowers 3 inches in diameter; sepals and petals oval-oblong, buff-yellow; lip shorter than the other segments, convolute into a tube, pale buff-yellow, the anterior margin bent downwards, much crisped, and of a chocolate-red colour; spur oblong-obtuse.

Phaius maculatus, Lindl. Gen. et. Sp. Orch. p. 127 (1831). *Bot. Mag.* t. 3960. *Hook. Cent. Orch.* t. 40. *Williams' Orch. Alb.* VIII. t. 381. *Bletia Woodfordii*, *Bot. Mag.* t. 2719. Blume, *Orch. Ind. Archipel.* p. 9.

Native of various parts of the lower Himalayan zone, where it occurs in swampy places. It was one of the numerous discoveries of Dr. Wallich, in the early part of the present century, and who sent it to Kew about the year 1822. Its spotted leaves generally distinguish it from all the cultivated species of *Phaius*, but instances have been observed in which the spots are absent.

P. philippinensis.

Pseudo-bulbs like the rhizome of an *Iris*, 1½—2 inches long, cylindric, with 5—6 rings when the sheaths have fallen. Leaves, two from each growth, lanceolate, acuminate, plicate, 9—15 inches long, narrowed below into a channelled petiole half as long as the blade. Scapes as long as or longer than the leaves, terete with equidistant joints, at each of which is a tubular spathaceous sheath, and terminating in a few-flowered raceme. Flowers leathery in texture, not fully expanding; sepals and petals oblanceolate-oblong, sub-acute, reddish brown, passing into light yellow at the margin, white outside; lip trumpet-shaped with a truncate mouth, the margin recurved, more or less frilled, white with a faint tinge of pink when first expanded, changing with age to pale yellow; spur obsolete, disk with three keels, of which the outside two are the shortest and most elevated. Column clavate, with broad rounded wings.

Phaius philippinensis, N. E. Brown in *Gard. Chron.* VI. s. 3 (1889), p. 239.

Detected by our collector, David Burke, on the slopes of the hills, at 3,000—4,000 feet elevation, in the Island of Mindanao, and thence interesting as being the first species of *Phaius* found in the Philippine Islands. It flowered for the first time in our Chelsea nursery in August, 1889. As a species it is remarkably distinct, especially in the structure of the labellum, which is neither three-lobed nor spurred, but "has a nearly truncate mouth with a slightly frilled, recurved margin, the emarginate apex is not in the least produced."

P. tuberculosus.

Pseudo-bulbs fusiform, annulate, prostrate or slightly ascending, 2—3 inches long. Leaves oblong-lanceolate, acuminate, 10—15 inches long.

Scapes erect, 12—18 or more inches high, sheathed by a whitish bract at each joint and terminating in a 5—7 flowered raceme. Flowers 2— $2\frac{1}{2}$ inches in diameter; sepals and petals white, elliptic-oblong, acuminate, with a depressed line above, slightly carinate beneath; lip three-lobed, the side lobes large, sub-orbicular, meeting above the column and forming a wide-mouthed funnel, orange yellow much spotted with red-purple and studded with white hispid hairs; middle lobe sub-quadratae, emarginate, with a crisped edge and deep yellow callus on the disk consisting of three broad denticulate ridges, white blotched with rose; below the callus is a dense tuft of sulphur-yellow hairs. Column clavate, arched, white above, purplish in front.

Phaius tuberculosus, Blume, Mus. Bot. II. p. 181 (1856), Rchb. in Gard. Chron. XV. (1881), p. 423. Williams' Orch. Abb. II. t. 91. *The Garden*, XXVI. (1884), t. 449. *Limodorum tuberculatum*, Thouars, Orch. Iles d'Afr. t. 35. *Bletia tuberculosa*, Spreng. Syst. Pl. III. p. 744 (1826). Lindl. Gen. et Sp. Orch. p. 123 (1831).

The most striking of all the species of Phaius. The flowers are not only of remarkable beauty, but also of singular structure and very difficult to describe. Although so recently introduced to British gardens, it was known as an herbarium specimen, in the early part of the present century, to the French naturalist Dupetit Thouars, and to the German botanist Sprengel, and through them the species became known to Dr. Lindley, who, following Sprengel, described it in his *Genera and Species of Orchidaceous Plants* under the name of *Bletia tuberculosa*. Blume subsequently referred it to Phaius, the correctness of which has since been confirmed by its hybridising with the Indian species, *Phaius Wallichii*. The plants at present in cultivation were collected in Madagascar by the brothers Humboldt, and through them introduced by Messrs. Sander and Co., in 1880. *P. tuberculosus* flowered for the first time in this country in the collection of Sir Trevor Lawrence, at Burford Lodge, in the spring of the following year.

Cultural Note.—Considerable difficulty has been experienced in growing and flowering this most interesting orchid, and much disappointment has ensued therefrom. One of the most successful instances that has come under our notice is that of the plants in the collection of Mr. A. Sillem, at Lawrie Park, Sydenham, where they receive the following treatment:—"The pots in which they are cultivated are large enough to allow the roots to spread freely in all directions; they are first filled to two-thirds of their depth with broken crocks and charcoal, then a layer of peat; on this the plants are placed, and around the stems the pots are filled to the brim with living sphagnum. By this arrangement the plants are in the same condition as they would be if growing on the surface of a bog (and this is probably their natural position); they can also be

freely watered, with rain water when possible, without getting sodden. They are placed in a shady corner of the Phalaenopsis house, where the temperature ranges from 18—21° C. (65—70° F.), and where they get plenty of air; the sphagnum and compost are kept moist all the year round, and the leaves are generally sponged over once a week to keep off the thrips that sorely affect this plant.”*

We may add that *Phaius tuberculosus* is also successfully cultivated in the Orchid collections of Sir Trevor Lawrence, Baron Schroeder and other amateurs, also in Mr. Wilson's garden at Weybridge. It has been found to thrive in a shaded stove under treatment similar to that described above.

P. Wallichii.

Pseudo-bulbs angulate, 3—6 inches high, di-triphyllous. Leaves elliptic-oblong, acute, nearly a yard long. Scape 3—4 feet high, bearing along its upper part a raceme of 15—20 large and showy flowers spirally arranged round the rachis. Sepals and petals linear lanceolate, $2\frac{1}{2}$ inches long, tawny brown, sometimes margined with yellow, whitish behind; lip broadly oval, convolute over the column, the basal half orange-yellow with a pale purple stain on each side; distal half reflexed at the apex, white with a yellow disk traversed longitudinally by 4—5 red lines, margin erose; spur yellow. Column pale yellow.

Phaius Wallichii, Lindl. Wall. Pl. Asiat. II, p. 46, var. t. 158 (1831). Gen. et Sp. Orch. p. 126. Paxt. Mag. Bot. VI, p. 193. Bot. Mag. t. 7023. P. Mannii, Hort.

var.—*bicolor*.

Pseudo-bulbs smaller and knobby like the rhizome of some species of *Iris*. Flowers smaller and differently coloured, especially the labellum, the spur and tube of which is tawny yellow, the front lobe white bordered with rose.

P. *Wallichii bicolor*, supra. P. *bicolor*, Lind. Gen. et Sp. Orch. p. 128 (1831). Id. Sert. Orch. t. 23. Bot. Mag. t. 4078. Thwaites, Enam. Pl. zeyl. p. 300.

Widely distributed throughout the lower Himalayan zone, inhabiting hot and damp valleys from Nepal eastwards to Assam and thence spreading southwards into Burmah. It was introduced to Chatsworth, in 1837, by Gibson, from the Khasia Hills, where “it luxuriates beneath a densely umbrageous covering of trees on such portions of rock as are partially covered with vegetable soil.”

The variety, long cultivated as a species under the name of *Phaius bicolor*, is a native of Ceylon, on the hills near Peradenia, at 2,000—4,000 feet elevation, where there is an annual rainfall of 100 inches. It was communicated to Dr. Lindley and probably to the Royal Gardens at Kew, by McRae, in 1836, or the following year.

* Gard. Chron. XXI (1884), p. 520.

HYBRID PHAIUS.

The only hybrid between species of *Phaius* that has flowered up to the present time is that described below, which was obtained by Mr. Norman C. Cookson, of Wylam-on-Tyne. Previous to its appearance the hybridisation of *Phaius* by hand had, so far as we are aware, been exclusively confined to our own nursery, and even there the operations were on a very limited scale, and undertaken with the sole object of obtaining bi-generic hybrids between *Phaius grandifolius* and *Calanthe vestita* or one of its varieties. Many years ago Dominy raised *P. irroratus*, Rchb. (*Phao-calanthe irrorata*; Rolfe) from *P. grandifolius* × *Calanthe vestita*, var. *Turneri nivalis*, which flowered for the first time in 1867; and Seden subsequently obtained from *P. grandifolius* × *Calanthe vestita*, var. *rubro-oculata*, another form, described below as *Phao-calanthe irrorata*, var. *purpurea*. The last-named hybridist has also obtained a progeny of stronger constitution and with handsomer flowers from *P. grandifolius* × *Calanthe Veitchii*, itself a hybrid, so that three species of two distinct genera have participated in its parentage. In all three cases the number of seedlings raised was extremely restricted. It is an interesting fact that these crosses have been effected between an evergreen and a deciduous species, and although their vegetative organs show, as might be expected, some intermediate characters, the evergreen element greatly preponderates, and the habit of all of them is much that of a *Phaius*. The flowers, too, have the triangular outline as seen in *P. grandifolius*, *P. Wallichii*, etc., to which they are also but little inferior in size. The sepals and petals are spreading, lanceolate, sub-equal and nerved nearly as in those species. The lip, also, is much more that of a *Phaius* than of a *Calanthe*, but it is more deeply lobed and has a more slender spur. The column has derived its most obvious characters from both genera, being clavate and stoutish as in *Phaius*, but winged below as in *Calanthe*; the pollinia are eight, the number common to both genera.

Phaius Cooksonii.

P. Wallichii × *P. tuberculosus*.

Pseudo-bulbs nearly as in *Phaius Wallichii*. Leaves intermediate between those of the two parents. Scapes shorter than the leaves, five or more flowered. Flowers as large as those of *P. Wallichii*; sepals and petals light rose tinted with yellow-brown along the middle,

Phaiocalanthe Seleniana.



the sepals lanceolate, the petals shorter, oval-oblong, acute; lip convolute into a broad-mouthed funnel, with a crisped margin that is reflexed at the apex; basal half yellow, which is prolonged to the apex, the lateral areas of the apical half rose spotted with carmine-purple.

Phaius Cooksonii, Rolfe in *Gard. Chron.* VII. s. 3 (1890), p. 388, fig. 57.

A very interesting hybrid with handsome flowers, of which the sepals and petals are nearly as in the seed parent *Phaius Wallichii*, while in the lip the influence of the pollen parent, *P. tuberculatus*, greatly preponderates.

Phaiocalanthe irrorata.

Flowers 2½ inches in diameter; sepals and petals cream-white with a slight tinge of green at the base and of pale rose towards the apex; lip red-purple margined with white, and with a large yellow disk traversed by three white longitudinal raised lines. Column white.

Phaiocalanthe irrorata, Rolfe in *Jour. Linn. Soc.* XXIV. (1887), p. 168. *Phaius irroratus*, Rehb. in *Gard. Chron.* 1867, p. 264. *Fl. Mag.* 1869, t. 426.

var.—*purpurea*.

Flowers as large as the preceding; sepals and petals pure white; lip red-purple striated, margin white, disk orange-yellow traversed by three white lines.

P. irrorata purpurea, supra. *Phaius irroratus purpureus*, Rehb. in lit.

As distinguished from *Phaiocalanthe irrorata*, the sepals and petals are of a purer white, the lip somewhat larger and more deeply lobed, its colour is richer, and the white margin broader.

P. Sedeniana.

Scapes stoutish, 2—3 feet high, bearing a 10—15 flowered raceme above. Flowers 2—3 inches in diameter; sepals and petals cream-white tinted with pale yellow and flushed with light rose colour at the base; lip distinctly three-lobed, the side lobes convolute over the column, yellowish with a broad rose-purple border, front lobe bilobate, white with a broad rose-purple border; disk with three raised median lines.

Phaiocalanthe Sedeniana, Rolfe in *Gard. Chron.* III. s. 3 (1888), p. 136. *Phaius Sedenianus*, Rehb. in *Gard. Chron.* I. s. 3 (1887), p. 174.

THUNIA.

Rehb. in *Bot. Zeit.* (1852), p. 764. Hook. f. *Bot. Mag.* sub. t. 5694.

As distinguished from *Phaius*, *Thunia* has no pseudo-bulbs, but jointed, biennial stems slightly nodose, and invested with leafy sheaths below that gradually pass upwards into true leaves. The

inflorescence is terminal and borne on the young leafy stems; the bracts are persistent.

The flowers are in drooping racemes of five to seven or more; the pedicels are short and enclosed at first in large sheathing spathes; the lip is traversed by 5—7 fringed lamellæ, the spur is short and obtuse, and the column has two small wings at the apex. The pollinia are four, but bipartite or equivalent to eight.

The three forms described below are horticulturally distinct, but scarcely specifically so; they usually flower from May to July. The genus is named after Count von Thun Hohenstein, of Tetschin, in Bohemia.

Cultural Note.—The plants should be re-potted about the middle of March in a compost of fibrous loam, silver sand, rough peat, and chopped sphagnum; the pots should be half filled with broken crocks for drainage, and the remaining space up to the brim with the compost, into which one or more stems may be placed according to the size of the pots used, and held firmly in their places by means of sticks; but they should not be crowded, as the Thunias root freely. The plants should then be placed in the lightest position in the East India or Dendrobium house, where they should remain till the flower buds appear. Water should be given sparingly at first, but when the young shoots push above the surface of the compost, it should be given more copiously, and occasionally a little manure water may be applied with advantage; the supply should be continued till the flowers are past, and even afterwards an occasional watering should be given so long as the leaves keep green. When these begin to change colour, the plants should then be allowed to enter upon their annual period of rest, and be stowed away in any light and dry place where the temperature does not sink below 10° C. (50° F.) and water entirely withheld.

The Thunias are among the very few tropical orchids that admit of being readily propagated. This is usually effected by cutting the previous year's shoots into lengths of about 6 inches each, and inserting them firmly in pots filled with drainage crocks and compost in the same proportion as for rooted plants. This operation should be performed in May or not later than June.

Thunia alba.

Stems 2½—3½ feet long. Leaves oblong-lanceolate, acuminate, 6—8 inches long, light green, glaucous beneath, and with a pale mid-nerve. Flowers in racemes of 5—9 or more on short white pedicels, sheathed by a large, white, boat-shaped bract; sepals and petals similar, white, oblong-lanceolate, acute; lip oval, oblong, with fringed anterior margin, white, with five fringed lamellæ on the disk that are sometimes purple,

sometimes citron-yellow and with some purple streaks on each side of them. Column short, slender, semi-terete, winged at the apex.

Thunia alba, Rehb. in Bot. Zeit. 1852, p. 764. *Phains albus*, Lindl. Gen. et Sp. Orch. p. 128 (1831). *Bot. Reg.* 1838, t. 33. *Bot. Mag.* t. 3991. *Paxt. Mag. Bot. V.* t. 125. *Hook. Cent. Orch.* t. 39.

sub-vars.—*Dodgsonii* (*Fl. Mag.* n. s. 1878, t. 329), syn. *flavotincta* (Gard. Chron. XX. 1883, p. 334), front part of the lip citron-yellow, streaked with purple; *nivalis*, lip pure white like the other segments.

Originally discovered by Dr. Wallich, growing on trees on one of the lower spurs of the Nepalese Himalayas, and subsequently gathered by one of the collectors for the Botanic Garden at Calcutta, in Sylhet, from which locality it was introduced by Messrs. Loddiges, about the year 1836. It was collected in the same locality in the following year for the Duke of Devonshire by Gibson, who found it growing upon trees in the shady damp forest at 2,000—3,000 feet elevation.* It is widely distributed through the lower Himalayan zone, and thence southwards over the eastern peninsula to the plains of Lower Burmah, Moulmein, etc., where it is quite common.†

T. Bensoniae.

Stems, leaves, and inflorescence as in *Thunia alba*. Flowers 3—4 inches across; sepals and petals amethyst-purple, paler, almost white at the base; the basal part of the lip whitish with entire edge, the distal part amethyst-purple with denticulate edge, and traversed longitudinally by numerous yellow fringed lines, five of which are prolonged to the base of the lip; spur notched. Column white, stained with purple.

Thunia Bensoniae, Hook. f. *Bot. Mag.* t. 5694 (1868). Williams' *Orch. Alb. II.* t. 67. *Phaius Bensoniae*, Hemsl., in Gard. Chron. XVIII. (1882), p. 565.

Discovered by Colonel Benson in the neighbourhood of Rangoon, in 1866, and also on the mountains of Moulmein and Arracan, at 1,500—2,500 feet elevation, where the average yearly temperature is about 27° C. (80° F.), and the annual rainfall often reaches 200 inches, but where from December to February the country around is charred and scorched by the intense heat that prevails at that season.‡ It flowered for the first time in this country in the Royal Gardens at Kew, and in our Chelsea nursery in July, 1867.

Thunia Bensoniae differs from *T. alba* in having larger flowers of

* For the temperature and other climatic phenomena of the lower Himalayan zone, see introductory notes to *Dendrobium*.

† Col. Benson in Gard. Chron. 1870, p. 796.

‡ Colonel Benson in Gard. Chron. 1870, p. 796, who also states that there is a yellow variety, probably *Thunia Marshalliana*.

a different colour, in which the middle lobe of the lip is longer in proportion to the entire length of that organ, and more oblong, and the column wings toothed.

T. Marshalliana.

Stems, leaves, and inflorescence as in the two preceding, except that the stems are usually more robust and taller; sepals and petals white, as is the basal half of the lip, the distal half is yellow, and the fringed lines orange-yellow. Compared with *Thunia alba* and *T. Bensoniae* the lip is shorter, the hairs forming the fringe of the lamellæ longer and more numerous; the column is shorter and stouter, with the apical wings more dilated.

Thunia Marshalliana, Rehb. in Linnaea XII. (1877), p. 65. Regel's *Gartenfl.* 1882, t. 1098. Williams' *Orch. Alb.* III. t. 130.

sub-var.—ionophlebia.

Central area of lip pale yellow, the side areas white streaked with purple.

T. Marshalliana ionophlebia, Rehb. in Gard. Chron. XXIV. (1885), p. 70.

We find no record of the habitat of this plant beyond the meagre statement that it is a native of Moulmein, where it may be assumed to grow under the same climatic conditions as *Thunia Bensoniae*.

HYBRID THUNIA.

Up to the present time, the hybrid described below is the only one raised by hand, and this, curiously enough, was obtained by two operators from *Thunia Marshalliana* × *T. Bensoniae*, first by the late Mr. Toll of Manchester, and shortly afterwards by Seden in our Chelsea nursery. Plants in flower from both progenies were exhibited simultaneously at one of the Royal Botanic Society's shows in 1885—Mr. Toll's under the name of *T. Wrigleyana*, in compliment to Mr. E. G. Wrigley, of Howick House, Preston, and our own as *T. Veitchiana*; but as the materials for description were supplied to the late Professor Reichenbach from the Chelsea seedling, our name has priority of publication.

Thunia Veitchiana.

Sepals and petals white with a flush of mauve-purple towards their tip; side lobes of lip white, intermediate lobe rose-purple with the fringed raised lines orange-yellow.

Thunia Veitchiana, Rehb. in Gard. Chron. XXIII. (1885), p. 818. *T. Wrigleyana*, Hort.

BLETIA.

Ruiz et Pav. Prod. 119, t. 26 (1794). Benth. et Hook. Gen. Plant. III. p. 513 (1883).

A genus of terrestrial orchids, including about twenty species, for the most part natives of tropical America, some of the most showy of which have been occasionally introduced to British gardens, but where they are now scarcely ever seen, except in botanical collections. The Bletia most generally cultivated at the present time is the first described below; an outlying member of the genus from China and Japan, and which has been but doubtfully referred to it, but which, with the addition of some American species, now forms the section *BLETILLA* of *Bentham*. To this we have added descriptions of three species of *Bentham's* section *EUBLETIA*, derived from the *Botanical Magazine*, two of which were in cultivation in the early part of the present century, and have been occasionally reintroduced since. *Bletia* was founded by the Spanish botanists, Ruiz and Pavon, on *B. catenulata*, a Peruvian species allied to *B. Sherrattiana*, very rarely seen in cultivation, and dedicated by them to their countryman, Don Luis Blet, an herbalist and apothecary. The general characters of the genus will be easily understood from the description of the species given below.

Cultural Note.—The Bletias, like *Thunia*, *Pleione*, and some of the *Calanthes*, are deciduous plants, and have alternate seasons of rest and active growth. The pseudo-bulbs should be re-potted as soon as they show signs of starting into growth, in a compost of loam and leaf-mould, giving a drainage of broken crocks to about 2 inches in depth, the pseudo-bulbs being simply covered with the soil, not pressed into it. While growing, the plants should be fully exposed to the light, placed in the *Cattleya* or intermediate house, and freely supplied with water. *Bletia hyacinthina* is a half-hardy species, and may be cultivated in a greenhouse. When the flowering is past, and the foliage begins to change colour, water must be gradually withheld and the plants kept dormant until the following spring.

Bletia hyacinthina.

Pseudo-bulbs tuberiform. Stems 6—9 inches high, furnished with 3—5 lanceolate acute plaited leaves. Peduncles terminal, slender, 6—10 flowered. Flowers on short purplish twisted pedicels, not fully expanding; sepals and petals similar, oblanceolate-oblong, acute, amethyst-purple; lip three-lobed, the side lobes roundish oblong, convolute over the column,* and coloured like the sepals and petals, the middle

* In the true *Bletias* the side lobes of the lip never enfold the column so distinctly as they do in this species.

lobe spreading, sub-quadrata with denticulate margin, and traversed longitudinally by five raised lines that extend to the base of the lip, deep purple. Column semi-terete with two narrow wings, purple above, whitish below.

Bletia hyacinthina, R. Br. in Ait. Hort. Kew, ed. 2, vol. V. p. 206 (1810—13). Lindl. Gen. et Sp. Orch. p. 120. Blume, *Orch. Arch. Ind.* t. 6, fig. 1. Regel's *Gartenfl.* XIII. t. 527 (var. *albo-stricta*). *The Garden*, XVI. (1879), t. 205. *Bletilla stricta*, Rchb. in Bot. Zeit. 1878, p. 75. *Bletia Gebina*, Bot. Reg. 1847, t. 60. *Cymbidium hyacinthinum*, Bot. Mag. t. 1492. And many others.

First introduced from China in 1803, by Mr. Evans, of the East India House; it also occurs wild in various parts of Kiusiu and Nippon in Japan. It is a somewhat variable plant, both in its foliage and in the colour of its flowers. Among the most noteworthy forms that have been in cultivation are:—*albo-stricta*, which has the leaves elegantly striped with white, and was introduced by Siebold from Japan. *Gebina*, introduced by Messrs. Loddiges and figured and described by Lindley as a distinct species, has nearly white flowers with a faint tinge of blush. Another form in Sir Trevor Lawrence's collection at Burford Lodge, not specially named, has deep amethyst-purple flowers.

B. Shepherdii.

Pseudo-bulbs roundish, about 2 inches in diameter. Leaves broadly lanceolate, tapering at both extremities, 15—20 inches long, deciduous. Scapes longer than the leaves, branched, many flowered. Flowers 1½ inches in diameter, of a uniform deep purple with the lamellæ of the lip white; sepals oblong, acute; petals broader, undulate; lip broadly cuneate, the front lobe strongly undulated, the disk with 5—7 wavy lamellæ. Pollinia eight.

Bletia Shepherdii, Hook. *Bot. Mag.* t. 3319 (1834). Paxt. *Mag. Bot.* II. p. 146.

Introduced by the Messrs. Shepherd, of Liverpool, in the early part of the present century from Jamaica, of which island it is a native. It is the richest coloured *Bletia* known to us; it is still occasionally seen in cultivation.

B. Sherrattiana.

"Pseudo-bulbs flattened, about 2 inches across. Leaves three or four, plicate, acuminate at either end, raised upon an upright stalk, including which they are nearly a yard long. Flowers of delicate texture, a dozen or more in a somewhat dense terminal raceme, bright rose colour; sepals oblong-lanceolate, obtuse; petals twice as broad, rounded; lip longer than the petals, deeply three lobed, the lateral lobes rounded, spreading, larger than the intermediate one, which is kidney shaped,

emarginate and apiculate; three parallel yellow lamellæ traverse the entire length of the axis of the lip. Column clavate, arched."—Bateman in *Botanical Magazine*, t. 5646.

Imported from New Granada in 1864 by Messrs. Low and Co. It flowered in Mr. Bateman's collection at Knypersley in 1867, and is named after Sherratt, his gardener at that time. It is described as one of the handsomest of *Bletias*, and coming from a country whose orchid wealth has been repeatedly explored, it is a remarkable fact that nothing appears to have been seen or heard of it since its first introduction; the mention of it in this place may tend to preserve it from oblivion.

B. verecunda.

"Pseudo-bulbs roundish, depressed, marked with rings, the scars of former years' leaves. Leaves ensiform, much acuminate, 2—3 feet long. Scapes 4—5 feet high, purplish below, green and branched above, many flowered. Sepals and petals similar and sub-equal, ovate, acuminate, of a uniform light rose colour, the lateral sepals keeled behind; lip longer than the petals, three-lobed, the lateral lobes curved upwards, purplish rose, yellow at the base streaked with purple lines, the middle lobe dilated and much cupped, deep purple; disk with fine yellow longitudinal lamellæ."—*Botanical Magazine*.

Bletia verecunda, R. Br. in Ait. Hort. Kew, ed. II. vol. V. p. 206 (1810—13). Lindl. Gen. et Sp. Orch. p. 121. Gard. Chron. XXVI. (1886), p. 140, icon. xyl. *B. acutipetala*, Hook. Bot. Mag. t. 3217. *Helleborine Americana*, Martyn. *Limodorum altum*, Linn. *L. verecundum*, Salisb. *L. tuberosum*, Jacq. *Cymbidium verecundum*, Sw. And many others.

Widely distributed over the West India Islands, it is also found in Florida and Mexico. Mr. Hemsley observes that "this orchid was cultivated by Collinson, or rather by Wager, in 1731, from bulbs received by the former as part of a dried specimen, and this is probably the earliest record of the cultivation of an exotic orchid in Great Britain."*

CHYSIS.

Lindl. Bot. Reg. 1837, t. 1937, and 1841, t. 23. Benth. et Hook. Gen. Plant. III. p. 514 (1883).

Although totally distinct in habit and aspect from the four preceding genera, Chysis nevertheless possesses the same essential sub-tribal characters.

* Gard. Chron. XVIII. (1882), p. 681.

As a genus, it is easily distinguished by its fleshy fusiform stems that are densely leafy upwards, and thickening after the leaves have fallen; by its short racemes of fleshy flowers produced from the axis of the young growths and in which the lateral sepals are adnate to the foot of the column; the lateral lobes of the lip are erect, and the two-winged column is produced at the base into a foot. Moreover, the pollinia are eight, four in each chamber (*loculus*); the capsule is nearly as large as that of a *Cattleya* of the *labiata* group, but instead of six acute ribs, there are three obtuse ribs alternating with three broad thick plates, beneath which dehiscence takes place when the fruit is mature.

The forms here described are those in cultivation; in addition to them, two or three others are known to science, but not yet introduced into gardens. They are all natives of Mexico and New Granada.

The genus was founded by Lindley upon *Chysis aurea*, one of the few orchids that have the power of self-fertilisation, and which in this case almost always takes place just before the flowers expand, and hence if the flower be examined after expansion, the pollinia are found to be more or less fused together. From this circumstance *Chysis* ($\chi\acute{\nu}\sigma\iota\zeta$, "melting") was selected for the generic name, although it is almost certain that Lindley was not aware of the cause of the fusion of the pollinia when he gave the name, as may be gathered from the laboured description of their appearance in the *Botanical Register* under plate 1937.*

Cultural Note.—*Chysis* may be cultivated either in pots or in teak baskets; the former filled with drainage to two-thirds of their depth are most commonly used. The compost should consist of equal parts of fibrous peat and sphagnum, and the plants should be grown in shade in a temperature ranging from 15—20° C. (60—70° F.) by fire heat according to the season of the year. Water must be supplied liberally during the growing season, but when the plants are at rest they require only a quantity sufficient to prevent the stems from shrivelling; the plants may then be removed to a cooler and drier position either in the same or in another house.

Chysis aurea.

Stems fusiform, 6—9 inches long, attenuated at the base into a foot-stalk and bearing at the apex 4—6 broadly lanceolate, acuminate leaves

* Nor, perhaps, was Mr. Bentham, who asks, "Lindley pollinia superiora cum massa materie viscidula semifusa descripsit, an in flore imperfecto vel monstroso? In floribus specierum 2 a nobis examinatis, pollinia vidimus omnia 8 perfecto distincte, etsi in uno flore valde inæqualia.

10—15 inches long. Scapes stoutish, a little longer than the stems, 5—7 or more flowered. Flowers 2 inches in diameter; sepals and petals oval-oblong, yellowish red, pale yellow at the base; lip three-lobed, the lateral lobes incurved, also pale yellow, middle lobe roundish, crisped, downy, spotted red and yellow, and with five white raised lines on the disk. Column broad, terete and pale yellow above, concave, and spotted with red beneath.

Chysis aurea, Lindl. *Bot. Reg.* t. 1937 (1837). *Bot. Mag.* t. 3617. Van Houtte's *Fl. des Serres*, t. 671 (copied from the *Bot. Mag.*).

var.—maculata.

Stems longer and more slender than in the Venezuelan and Mexican types, and the flowers differently coloured; sepals and petals white at the base, the remaining area tawny yellow toned with purple; side lobes of lip yellow with a brown-purple stain at the base, middle lobe purple with pale markings.

C. aurea maculata, Hook. *Bot. Mag.* t. 4576.

Discovered by Henchman in 1834, in the valley of Cumancoa (Cumano?), in Venezuela, "growing suspended by long fibrous roots from the lateral branches of trees, so that its pseudo-bulbs, which in their growing state are uncommonly brittle, hang downwards and wave in the wind, which would otherwise be sufficient to break them." It was shortly afterwards introduced by Messrs. Low and Co., of Clapton, through its discoverer. We have since received it from the neighbourhood of Cordova, in Mexico, with *Chysis bractescens*.

Chysis aurea flowers in April and May, but it is not unusual for its flower scapes to appear at other times of the year; owing to its power of self-fertilisation, the flowers last but a short time after expansion. The variety *maculata* first appeared among an importation of Columbian orchids that was offered for sale at Stevens' Rooms, in 1850; it has since been recently re-imported by Messrs. Shuttleworth and Co., of Park Road, Clapham.

C. bractescens.

Stems, leaves, and inflorescence as in *Chysis aurea*, but somewhat more robust. Flowers 3 inches in diameter, on short stout pedicels (including ovary), sheathed by a large foliaceous bract; sepals and petals ivory-white, the former oblong, the latter obovate-oblong; lateral lobes of lip oblong, incurved, white on the outside, yellow streaked with red on the inner side; middle lobe sub-quadrata with a shallow sinus in the anterior margin, yellow streaked and stained with red;

on the basal half of the lip are five slightly divergent fleshy ridges. Column white above, yellow beneath.

Chysis bractescens, Lindl. Bot. Reg. 1840, misc. No. 131. *Id.* 1841, t. 23. *Bot. Mag.* t. 5186. Van Houtte's *Fl. des Serres*, VII. t. 675. *Illus. hort.* 2nd ser. t. 398. Sander's *Reichenbachia* I. t. 18.

Introduced from Mexico by Mr. Barker, of Birmingham, in whose stoves it flowered for the first time in 1840. It has since been frequently received from Cordova, in the province of Vera Cruz, and from Tabasco, where it grows under similar conditions and in the same way as *Chysis aurea*. Its flowering season is March and April. The large bracts and cream-white flowers chiefly distinguish this species from all the others in cultivation.

C. *lævis*.

Stems club-shaped, 12—18 inches long. Leaves ovate-lanceolate, acuminate, spreading, shorter than the stems. Racemes 9—12 flowered; flowers 2½ inches in diameter. Sepals oblong, the dorsal one inflexed, the lateral two falcate and spreading, tawny yellow tinged with brown at the base; petals similar but paler in colour; lip three-lobed, the side lobes folding over the column, pale yellow streaked with red on the inner side, the middle lobe sub-orbicular with crisped margin, bright yellow with five white raised lines on the disk that are confluent towards the base. Column pale yellow spotted with red on the side facing the lip.

Chysis levis, Lindl. Bot. Reg. 1840, misc. 130. Batem. *Orch. Mex. et Guat.* t. 31. *Illus. hort.* t. 365 (1863). Warner's *Sel. Orch.* II. t. 14.

Introduced from Mexico about the same time as the preceding, by Mr. Barker, in whose collection at Springfield, near Birmingham, it flowered for the first time in 1840. It is distinguished from *Chysis aurea* by its longer stems furnished with more leaves, by its larger flowers with a differently-formed lip which is not downy, and by its flowering later in the year.

C. *Limminghei*.

Stems, leaves, and inflorescence as in *Chysis aurea*, but somewhat smaller in all their parts. Flowers 2 inches in diameter; sepals and petals oval-oblong, white, the sepals with a pale and the petals with a bright purple apical blotch; side lobes of lip incurved towards the column, reddish purple and yellow on the inner side, pale buff-yellow externally; middle lobe oval-oblong, emarginate, bright purple, streaked with white. Column cymbiform, white above, yellow spotted with red on the side opposite the lip.

Chysis Limminghei, Lind. et Rchb. in Otto et Diet. Allg. Gart. Zeit. 1858. *Illus. hort.* 1860, t. 240. Warner's *Sel. Orch.* I. t. 34. *C. aurea*, var. *Limminghei*, *Bot. Mag.* t. 5285 (*Lemminghei*). Hemsley, Biolog. Cent. Amer. III. p. 216.



Chysis Cheloni.

Introduced in 1857 by M. Linden, through Ghiesbrecht, who discovered it in the Mexican province of Tabasco. It is dedicated to Comte Alfred de Limminghe, a Belgian nobleman who was a liberal patron of horticulture in his time. With the exception of the colour of the flowers, which far surpass those of *Chysis aurea* in beauty, there is but very little to distinguish the *C. Limminghei* described above from that species, although the late Professor Reichenbach maintained that the *C. Limminghei* of himself and Linden is a good species distinguishable in the dark by the touch from *C. aurea*.*

HYBRID CHYSIS.

The scarcely specific difference that subsists between at least three of the forms described above, renders cross-fertilisation among them comparatively easy, except that it is scarcely possible to make *Chysis aurea* the seed parent on account of its power of self-fertilisation before its flowers expand, a phenomenon not observed in any other Chysis. Although capsules and seeds are obtainable without difficulty, the raising of seedlings is not thereby attended with any less trouble than in the case of other genera, nor can much variety be expected from so limited a field of operations as Chysis offers to the hybridist. The two hybrids described below were both raised by Seden at our nursery; both are distinct and highly appreciated by amateurs.

Chysis Chelsoni.

C. bractescens × *C. laevis*.

Sepals and petals pale tawny yellow at the base and with a large reddish fawn blotch at the apex; basal half of lip coloured like the basal parts of the other segments; apical half yellow spotted with red, the raised lines white spotted with purple. Column pale yellow spotted with red on the under side.

Chysis Chelsoni, Rchb. in Gard. Chron. I. (1874), p. 535. *Fl. Mag.* n.s. t. 297.

O. Sedeni.

C. Limminghei × *C. bractescens*.

Sepals French-white; petals purer white with a large light rose-purple blotch near the apex; side lobes of lip sulphur-yellow with some purple streaks at the base on the inner side; intermediate lobe amethyst-purple streaked with white. Column white on the upper, pale yellow spotted with purple on the lower side.

Chysis Sedeni, Rchb. in Gard. Chron. XIII. (1880), p. 616.

* Walp. Ann. VI. p. 472. "Species me judice optima: *Chysis Limminghei* ipsa luce deficiente, noctu facillime nonnisi tactu a *C. aurea* distingui potest. Hujus labellum apice crispolobatum, illius apice planum," but we have not observed the difference here noted in any of the plants seen by us in cultivation.

SUB-TRIBE *CÆLOGYNEÆ.*

Stems usually pseudo-bulbous, diphylloous or many-leaved. Peduncles one-flowered or racemose. Column produced at the base into a foot or footless. Pollinia 4; in Trichosma, 8.

TRICHOSMA.

Lindl. *Bot. Reg.* 1842, t. 21. Benth. et Hook. *Gen. Plant.* III. p. 618 (1883).

This includes the single species described below, which was at first referred by Lindley to *Cœlogyne*, but from which it is separated chiefly by its stems being not thickened into a pseudo-bulb and by its pollinia being eight instead of four. He therefore raised it to generic rank under the name by which it is now generally known, but afterwards, following Reichenbach, he referred it to *Eria*, but here again, as pointed out by Bentham, "the habit, the strictly terminal raceme, and the laterally compressed pollen-masses are those of *Cœlogyneæ* rather than of *ERIEÆ*."* On these grounds, therefore, *Trichosma* is retained. The name is compounded of θρίξ, τριχός (thrix, trichos), "hair," and κόσμος (kosmos), "ornament," in reference to the fringed lamellæ of the lip.

Trichosma suavis.

Stems tufted, about as thick as a goose quill, 6 inches long, with a few sheathing scales at the base and two opposite oblong-lanceolate recurved leaves at the apex. Racemes from between the leaves 3–5 or more flowered. Flowers fragrant, about an inch in diameter; sepals and petals similar and sub-equal, oblong-lanceolate, cream-white; lip three-lobed, the side-lobes erect, white, streaked on the inner side with red-purple, the middle lobe oblong, acute, reflexed, with five crisped bright yellow lamellæ, the margin on either side being white and brown-purple. Column produced at the base into a foot, to which the lip is articulated and the sepals adnate, there forming a *mentum* or chin, as in *Dendrobium*.

Trichosma suavis, Lindl. *Bot. Reg.* 1842, t. 21. Williams' *Orch. Alb.* III. t. 114. *Cœlogyne coronaria*, Lindl. *Bot. Reg.* 1841, misc. No. 178. *Eria coronaria*, Rchb. in Walp. *Ann.* VI. p. 271 (1861). *Id.* in *Gard. Chron.* V. (1876), p. 284. *E. suavis*, Lindl. in *Jour. Linn. Soc.* III. p. 52. *E. cylindripoda*, Griff.

Discovered by Gibson in the Chirra district of the Khasia Hills, in 1836, growing upon trees in densely-shaded woods near the summit of the hills; it flowered for the first time in this country at Chatsworth,

* *Jour. Linn. Soc.* XVIII. p. 307.

in 1841; its usual flowering season is the winter months. It has been frequently imported since its first discovery, and there are few orchid collections of any pretensions in which it is not represented, and where its fragrant flowers render it peculiarly acceptable at a season when comparatively few other orchids are in bloom. It is slightly variable, the deviations from the original type being chiefly in the size of the flowers and in the colour and markings of the lip.

Cultural Note.—The treatment of "cool" orchids, as formulated under *Odontoglossum*, is that which is most suitable for *Trichosma*. If grown in the *Cattleya* house, the coolest and shadiest position must be selected for it.

CŒLOGYNE.

Lindl. Collect. Bot. sub. t. 33 (1821—25). Id. Gen. et Sp. Orch. p. 38 (1831). Benth. et Hook. Gen. Plant. III. p. 518.

This is a noble genus including many species of great horticultural merit, some of which (including *Pleione*) are in flower in every month of the year. About fifty named species are known to science, as well as others that yet remain unnamed and undescribed, widely dispersed over the Indo-Malayan region, one (*Cœlogyne fimbriata*) spreading into southern China. The Cœlogynes are particularly abundant in the valleys of the lower Himalayan zone, especially in Sikkim and eastern Nepal, up to about 7,000 feet elevation, but *C. (Pleione) Wallichii* and *C. Hookeriana* ascend as high as 10,000 feet. "On the ascent from Darjeeling the straight shafts of many of the timber trees are literally clothed with a continuous garment of white-flowered Cœlogynes which bloom in a profuse manner, whitening their trunks like snow."* They are scarcely less common in some parts of the Malay Archipelago, where they occur in moist shady places on rocks and trees by the side of streams, and also on the hill sides, not infrequently at considerable elevation; these Malayan species belong chiefly to the sub-section *Flaccide*, and have mostly dull whitish brown or greenish white flowers.

The genus as monographed by Dr. Lindley in his *Folia Orchidacea* is divided by him into three sections, which are adopted by Mr. Bentham in the *Genera Plantarum* nearly as Lindley left them. The first section, *NEOGYNE*, includes but one species, *Cœlogyne Gardneriana*,

* Hooker, Journ. I. p. 110.

which for horticultural purposes may be associated with EUCELOGYNE (the true Cœlogynes). Not so, however, PLEIONE, Lindley's third section, which differs from EUCELOGYNE in the one- sometimes two-flowered peduncle, but more especially in the vegetative organs, the clustered pseudo-bulbs and leaves that are deciduous, and in some other characteristics which necessitate for them a cultural treatment quite different from that of the true Cœlogynes. We therefore find it advisable to separate the Pleiones from Cœlogyne, regarding the former as a sub-genus of the latter.

The section EUCELOGYNE was divided by Lindley into sub-sections that are founded chiefly on differences observable in the inflorescence. Of these, *Erectæ* (*Normales*, Bentham), with few-flowered, erect racemes, and *Flaccidæ*, with many-flowered, drooping racemes, are natural and distinct; while *Filiferae*, including species with narrow petals, and *Proliferae*, having hard, imbricating scales immediately below the flowers, are somewhat artificial divisions, and may be neglected by cultivators. A fifth sub-section, with erect flexuose racemes, includes two or three Malayan species unknown in cultivation. Of the *Erectæ*, *Cœlogyne ocellata* is a good representative type, and of the *Flaccidæ*, *C. flaccida* is the type, and *C. cristata*, *C. Massangeana* and *C. Dayana* are well-known favourites.

The following characters are common to nearly all the species referred to EUCELOGYNE:—

The *pseudo-bulbs* are seated on a scaly rhizome, at longer or shorter intervals; they are usually of ovoid form, but sometimes elongated and angulate, and are persistent several years. They bear at their apex two leaves that are sometimes of large size with long foot-stalks and folded (plicate) blades, and are persistent two or more years.

The *inflorescence* is loosely racemose, the scapes as well as the pedicels and ovaries of the flowers are enclosed in sheathing pale brown bracts; these, both caudine and floral, are usually very large, the latter often falling before the flowers.

The *flowers* are either large or of medium size, of which the sepals and petals are nearly similar and sub-equal; in the sub-section *Filifera*, the petals are very narrow; the lip is sessile at the base of the column which it embraces, and is traversed longitudinally either a part or the whole of its length by 2—5 or more fringed or sinuous raised lines. The elongated column is winged on both sides, the wings being gradually dilated upwards. The pollinia are four.

The genus Cœlogyne was founded by Dr. Lindley, in 1825, on

the well-known *Cœlogynæ cristata*, which had been discovered by Dr. Wallich, in Nepal, the year before. The name is derived from κοῖλος (koilos), "hollow," and γυνὴ (gunè), "a female," in reference to the depression of the stigma.

Cultural Note.—The compost used for the true Cœlogynes is the usual mixture of fibrous peat and chopped sphagnum in equal proportions. The species belonging to the sub-section *Erectæ* are best grown in pots with efficient drainage; those belonging to the sub-section *Flaccidae*, on account of their long pendulous scapes are best placed in teak baskets or shallow pans that can be suspended near the roof-glass of the house in which they are cultivated. The re-potting of the plants should be performed early in the year when they begin to emit new roots. As regards temperature and watering, the geographical station of the species and its climatic conditions afford the safest guide to practice; thus, those species from elevated localities on the mountain sides, such as *Cœlogynæ barbata*, *C. cristata*, *C. elata*, *C. Gardneriana*, etc., require a lower average temperature, such as is maintained in the Cattleya house, than those from the hot damp lowlands in the equatorial zone as *C. asperata*, *C. Cumingii*, *C. Dayana*, *C. pandurata*, etc., which should be grown in the East Indian house, but always in partial shade. The supply of water also should be regulated according to the same conditions and the season of the year, taking care that the compost is, at no time, allowed to get quite dry. For the temperature and rainfall of the equatorial zone and Indo-Malayan region in general, the reader should refer to the notes on the subject under *Dendrobium*.

Cœlogynæ asperata.

Pseudo-bulbs ovate-oblong, angulate, 5—6 or more inches long. Leaves lanceolate, acute, 20—30 inches long. Racemes pendulous, 12—15 inches long, issuing from a sheath composed of 6—8 distichous and alternate, imbricating leafy bracts, 7—10 flowered. Flowers $2\frac{1}{2}$ —3 inches across; sepals lanceolate, keeled; petals similar but narrower, both sepals and petals of a uniform cream-white; lip three-lobed, the side lobes oblong-obtuse, white, streaked with red-brown on the inner side; the intermediate lobe sub-rotund, crisped at the margin; disk with 2—3 unequal warty ridges, orange-red with a central raised line between them that is prolonged to the base, the marginal area pale yellow streaked with red-brown. Column clavate, triquetral, pale straw-yellow with a rounded auricle on each side of the rostellum.

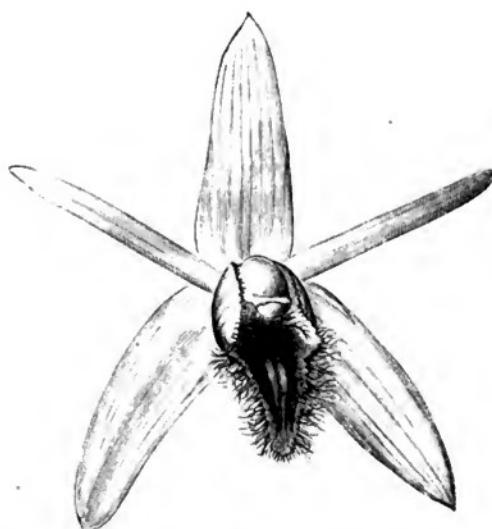
Cœlogynæ asperata, Lindl. in Jour. Hort. Lond. IV. p. 221 (1849). Id. Fol. Orch. Cœlog. No. 6. Linden's Pesc. t. 8. Williams' Orch. Alb. VII. t. 311. C. Lowii, Part. Mag. Bot. XVI. p. 225 (1850).

Introduced from Sarawak, in North Borneo, in 1849, by Messrs. Low and Co., whence the species became associated with the name

of the firm. It is widely distributed over the Malay Archipelago from Sumatra to New Guinea, growing in the hot damp lowlands near the coast, and in proximity to streams, attached chiefly to the overhanging branches of large trees, and always in partial shade. It is one of the commonest epiphytes yet met with on the coast of eastern New Guinea.

C. *barbata*.

Pseudo-bulbs sub-pyriform, bluntly angulate, $1\frac{1}{2}$ —2 inches long. Leaves broadly lanceolate, 12—18 inches long, narrowed below into a short petiole. Peduncles erect, nearly as long as the leaves, terminating in a 6—9 flowered raceme, below which are a number of hard imbricating



Cœlogyne barbata.

scaly bracts. Flowers $2\frac{1}{2}$ —3 inches in diameter; sepals and petals white, the former ovate-oblong, acute, the latter linear lanceolate; lip inflated at the base, three-lobed, the side lobes oblong with the anterior margin fimbriate, white externally, pale brown on the inner side; middle lobe oblong, reflexed, fimbriate, blackish brown with three raised lines fringed with shaggy blackish hairs. Column white.

Cœlogyne barbata, Griffith Notulae ad Plant. asiat. III. t. 291 (1851). Lindl. Pol. Orch. Cœlog. No. 21 (1854). Williams' Orch. Alb. III. t. 143.

First discovered by Griffith in Bhotan, and afterwards by Gibson and Thomas Lobb, on the Khasia Hills, near Mamloo, at 4,000—5,000 feet elevation, and also by Sir J. D. Hooker and Dr. Thomson at Chnrra Punjee. It does not appear to have been introduced alive till 1878—9, when it was imported by Mr. William Bull. With *Cælogyne elata* and four or five other species, with small greenish flowers that are of no horticultural merit, it forms a sub-section of the genus, characterised by the presence of a number of hard imbricated scales immediately below the raceme, and named by Lindley *Prolifera*, by reason of "a second scaly sheath, being often (perhaps always) produced beyond the first series of flowers, and out of that sheath arises a second series of flowers." The dusky brown anterior lobe of the lip and the clear white sepals and petals present one of the most remarkable colour contrasts ever seen, even among the Orchidææ. *C. barbata* usually flowers in the late autumn.

C. corrugata.

Pseudo-bulbs ovate-conic, 2½—3 inches long, angulate and much wrinkled when old. Leaves 6—12 inches long, the shorter ones elliptic-oblong, sub-acuminate, the longest oblong-lanceolate. Peduncles erect, shorter than the leaves, 3—5 flowered. Flowers 2—2½ inches across vertically, with a brown oblong-acute bract sheathing each pedicel; sepals and petals similar and sub-equal, elliptic-oblong, acute, keeled behind, French-white; lip shorter than the other segments, the side lobes oblong, yellow striped with red on the inner side, the middle lobe ovate, acuminate, white with a yellow disk traversed by three fringed white lamelle that reach to the base of the lip.

Cælogyne corrugata, Wight, Icon. pl. ind. or t. 1639 (1852). Lindl. Fol. Orch. Cœlog. No. 15 (1853). *Bot. Mag.* t. 5601.

A species well distinguished by its curiously wrinkled pseudo-bulbs, first gathered by Dr. Wight about the year 1845 on the Neilgherry Hills in the neighbourhood of Courtallum, Southern India, flowering in August and September, and where it was subsequently found by Thomas Lobb, but who failed to send home living plants. It was first cultivated in England in the Royal Gardens at Kew in 1863, but it is still very rare in British collections.

C. corymbosa.

Pseudo-bulbs ovoid, 1½—2 inches long, ribbed with a transverse keel a little above the middle. Leaves oblong-lanceolate, acute, 6—8 inches long. Racemes from the young growths before the leaves have p

expanded, 3—5 flowered. Flowers 2—3 inches in diameter; sepals and petals cream-white, the former lanceolate-ligulate, the latter linear-lanceolate, all keeled behind; side lobes of lip angulate, toothed at the apex, white with red-brown nerves and markings, and a yellow spot bordered with orange-red at the anterior margin; the middle lobe ovate-lanceolate, acute, entire, white with a transverse yellow bar near the base. Column clavate, arched, white above, yellow below, wings rather broad at the apex.

Ceologyne corymbosa, Lindl. Fol. Orch. Cœlog. No. 16 (1854). Rchb. in Gard. Chron. VI. (1876), p. 8. Id. II. s. 3 (1887), p. 73, icon. xyl. Bot. Mag. t. 6955.

First detected by Sir J. D. Hooker in 1849 on the Sikkim Himalayas, at 5,000—8,000 feet elevation, and shortly afterwards by the same eminent botanist in company with Dr. Thomson on the Khasia Hills. It was not introduced till 1876, when it was imported by Mr. William Bull, of Chelsea. *Ceologyne corymbosa* is very near *C. ocellata*, from which it may be distinguished by its differently shaped pseudo-bulbs, and its fewer flowered racemes of larger flowers with a longer and more acute lip; it flowers in the spring months, when its delicate and fragrant blossoms are among the most attractive objects in the orchid house.

C. cristata.

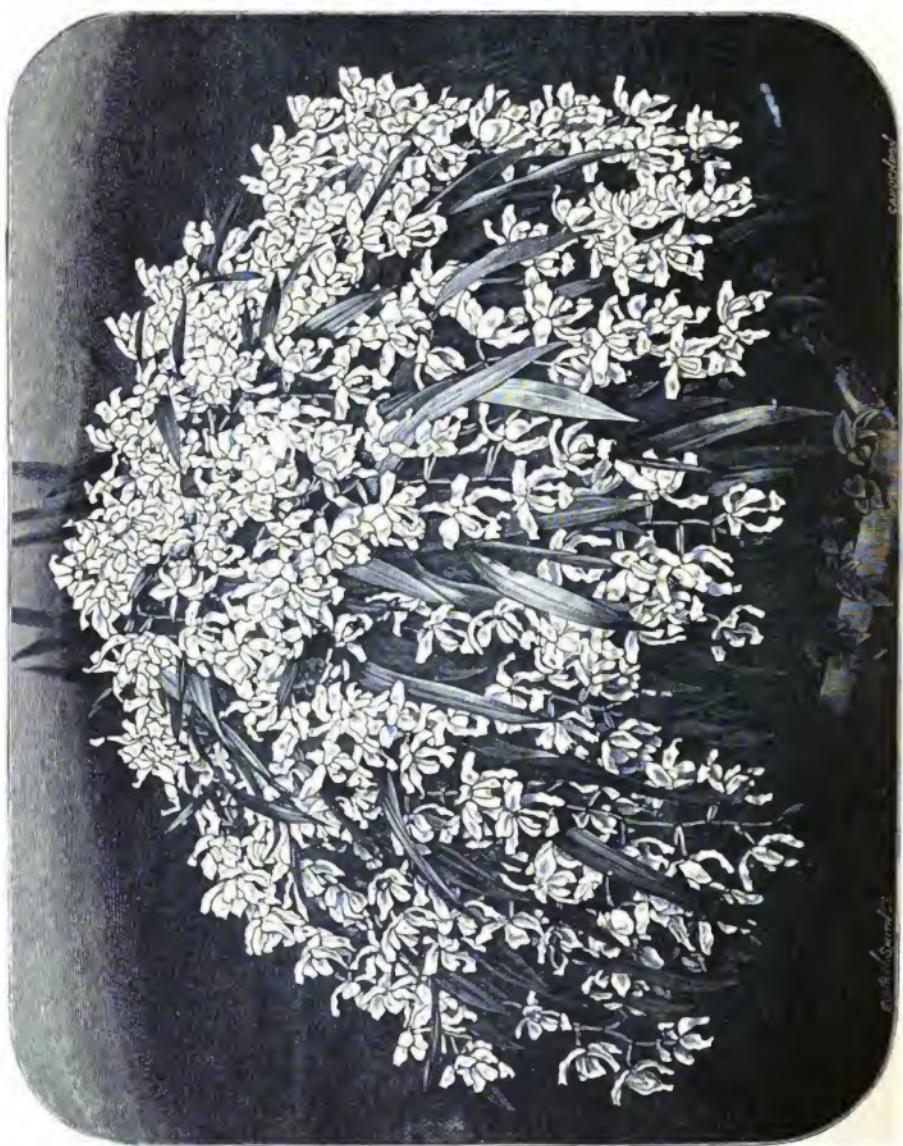
Pseudo-bulbs ovoid-oblong, obscurely angulate, 1½—2 inches long, produced from a scaly rhizome at intervals of 1—2 inches. Leaves linear-lanceolate, acute, 8—12 inches long. Racemes drooping, as long as, or longer than the leaves, 5—9 flowered. Flowers among the largest in the genus, on whitish pedicels sheathed by reddish brown acute bracts, pure white except the orange-yellow disk and lamellæ of the lip; sepals and petals similar and equal, lanceolate-oblong, acute, much undulated; lip oval, three-lobed, the side lobes incurved, roundish oblong, the intermediate one spreading transversely oval with the front margin denticulate. Column winged.

Ceologyne cristata, Lindl. Collect. Bot. sub. t. 33 (1821—25). Id. Gen. et. Sp. Orch. p. 89 (1831). Id. Bot. Reg. 1841, t. 57. Id. Fol. Orch. Cœlog. No. 20 (1854). Regel's Gartenfl. VIII. t. 245. Linden's Peac. t. 25. Warner's Sel. Orch. I. t. 35. Van Houtte's Fl. des Serres, t. 1807 (1867—8). Jennings' Orch. t. 7. Gard. Chron. VIII (1877), p. 597, icon. xyl. Id. III. s. 3 (1888), p. 489, icon. xyl.

sub-var. — *Arnigadu* (Gard. Chron. III. s. 3 (1888), p. 462), sepals and petals plain, not crisped, keels of the lip orange-yellow; *Chatsworth*, flowers larger, more regular in form, and appearing later in the season; *hololeuca* (Rchb. Gard. Chron. XX. (1881), p. 563), syn. *alba* (Williams' Orch. Alb. II. t. 54), pseudo-bulbs more distantly placed on the rhizome, flowers wholly white; *Lemoniana*, syn. *citrina* (Godefroy's Orchidophile, 1888, p. 212), disk and fringed lamellæ of the lip citron (not orange) yellow; *intermedia*, intermediate between the type and *Lemoniana*, with an orange spot at the base of the lip; *maxima* (Sander's



Coelogyne cristata.



Caelogyne cristata (Chatsworth variety).

(From the *Gardener's Chronicle*.)

Reichenbachia, I. t. 6; *The Garden XXXI.* (1887), t. 585), flowers larger in all their parts; *Trentham*, flowers produced six to eight weeks later than in the other forms.

Cœlogyne cristata was originally discovered by Dr. Wallich, in 1824. Its native home is in the lower Himalayan zone, at elevations ranging from 4,500—7,500 feet from Sikkim westwards through Nepal as far as the 75th meridian, plants which had been collected at Arnigadh at 5,000 feet elevation having been recently sent to Kew from the Botanic Garden at Saharunpore;* it is particularly abundant on the range of hills opposite Cessagurri, in Nepal, growing indifferently upon trees and upon bare rocks, often in full exposure to the sun. It was introduced by Gibson, in 1837, but we find no record of its having flowered in this country till the spring of 1841, when Mr. Barker, of Springfield, near Birmingham, received a Knightian Medal for it at one of the meetings of the Horticultural Society of London, where it attracted marked attention, and has since by general consent been recognised as the *facile princeps* of all Cœlogynes. The varieties described above, although sufficiently distinct for horticultural purposes, differ in little from the original type, except either in the size of the flower, the colour of the disk of the lip and its fringes, or in the time of flowering; they are therefore more strictly sub-varieties or mere variations. The Arnigadh variety was sent to Kew by Mr. Duthie, superintendent of the Botanic Garden at Saharunpore, in January, 1886; the Chatsworth form was brought from India by Gibson, in 1837; *hololeuca* first appeared a few years ago in the collection of Mr. T. A. Titley, at Gledhow, near Leeds; *Lemoniana* first appeared many years ago in the collection of Sir Charles Lemon, at Carclew; *intermedia* is in cultivation at Syon House and other places; the Trentham form has long been cultivated in the Duke of Sutherland's collection at Trentham Hall, in Staffordshire; of the origin of *maxima* we find no record.

Cultural Note.—*Cœlogyne cristata* is a plant that may be easily cultivated in glass structures used for miscellaneous subjects, and as its chaste white flowers are in general request in winter and early spring, the following cultural hints may prove acceptable. The temperature of a warm greenhouse or intermediate house will be sufficient for it, although a summer temperature of 15°—21° C. (60°—70° F.) is by no means too high; a light shading is

* Gard. Chron. III. s. 3 (1888), p. 462.

only necessary when the sun is powerful; at other times the plants should receive all the light possible. During the season of active growth, water should be copiously given, as well as an occasional syringing to keep the bulbs plump and the foliage clean and healthy. As the season advances towards autumn, the waterings must be diminished in frequency and quantity till the plants are quite at rest, when only sufficient must be given to keep the bulbs from shrinking. For large masses of *C. cristata*, square teak baskets are often used, but perforated pans of about 6 inches in depth are still better; the drainage must be ample and free, and the compost should consist of equal proportions of fibrous peat and chopped sphagnum.

C. Cumingii.

Pseudo-bulbs ovate-conical, compressed, 2—3 inches long. Leaves lanceolate-acuminate, 5—8 inches long, including the lengthened petioles. Scapes from the axis of the newest growths, sub-erect, sheathed by yellow-brown bracts, 3—5 flowered. Flowers 2 inches across, French-white with a citron-yellow disk on the lip; sepals lanceolate, acuminate; petals linear-lanceolate; lip three-lobed, the side lobes roundish, turned inwards, the middle lobe reflexed, obovate-oblong with minutely denticulate margin, the disk traversed longitudinally by three central crisped lamellæ that are prolonged to the base of the lip, and two lateral shorter ones, all terminating in front in an orange-red tooth. Column terete and white above, concave on the under side on which is a yellow band.

Cœlogyne Cumingii, Lindl. in Bot. Reg. 1840, misc. No. 178. *Id.* 1841, t. 29. *Bot. Mag.* t. 4645. Van Houtte's *Fl. des Serres*, VIII. t. 764 (copied from Bot. Mag.)

Sent by Cuming from Singapore, in 1840, to Messrs. Loddiges, in whose nursery it flowered for the first time in 1841. It is a pretty and distinct species, usually flowering in the month of August, but it is now rarely seen in British collections. We are indebted to Sir Trevor Lawrence, Bart., for materials for description.

C. Dayana.

Pseudo-bulbs cylindric-fusiform, angulate, 5—9 inches long. Leaves oblong-lanceolate, acuminate, 24—30 inches long. Scape quite pendulous 24—30 inches long, racemose from the base, many flowered. Bracts sub-rhomboidal, inflated, as long as the pedicels and ovaries, dusky brown. Flowers 2—2½ inches in diameter; sepals and petals stellate, pale nankeen-yellow, linear-ligulate with reflexed margins, the sepals keeled behind, the petals narrower than the sepals; lateral lobes of lip oblong, reflexed at the anterior edge, brown streaked with white on the inner side; middle lobe sub-quadrata, reflexed, apiculate, with a fleshy disk

consisting of six white erect keels with brown fringes on the anterior side, two of which are prolonged to the base of the lip. Column clavate, slender, arched.*

Cælogyne Dayana, Rehb. in Gard. Chron. XXI. (1884), p. 826. Williams' *Orch. Alb. VI.* t. 247.

Introduced by us from North Borneo, through Curtis, and dedicated by Professor Reichenbach, at our request, to the late Mr. John Day, of Tottenham. It flowered for the first time in this country at our Chelsea nursery in June, 1884. As a species it is comparable with *Cælogyne Massangeana* as regards its long pendulous racemes; but in the colour of its flowers, and especially in its vegetative organs, it is thoroughly distinct. In its native country it invariably grows upon the branches of large trees in the hot lowlands near the coast, and on the banks of streams under the same conditions as the closely allied species *C. asperata* and *C. pandurata*.

C. elata.

Rhizome stout, clothed with pale brown scales. Pseudo-bulbs placed at intervals of about 2 inches along the rhizome, ovoid, compressed and bluntly angulate, 3—4 inches long. Leaves stalked, ensiform, acute, 12—18 inches long. Scapes erect, a foot high, with a number of hard, imbricated, brown bracts immediately below the 7—9 flowered raceme.† Flowers on short white pedicels, cream-white; sepals broadly lanceolate; petals linear oblong; lip obovate, obscurely three-lobed, white with an orange-yellow blotch, below which are two waved and crisped crests dotted at the edge with red. Column narrowly winged.

Cælogyne elata, Lindl. Gen. et. Sp. Orch. p. 40 (1831). Id. Bot. Reg. 1839, misc. No. 151. Fol. Orch. Cælog. No. 22. Bot. Mag. t. 5001.

First detected by Dr. Wallich in Nepal, and introduced by him to the garden of the Horticultural Society at Chiswick, where it flowered for the first time in 1839. It was subsequently found by Sir J. D. Hooker in Sikkim, at 4,000—6,000 feet elevation, and by other explorers in other localities. Still later it was observed by Mr. H. J. Elwes, "growing abundantly at 8,000—9,000 feet elevation, on the slopes of Tongloo, near Darjeeling; in one case a fine old yew tree was covered with it."‡ The flowers, which usually appear in February and March, are among the prettiest of the genus, but the rambling habit of the plant renders it a somewhat awkward subject for cultivation.

* For woodcut of flower of *Cælogyne Dayana*, see *C. Massangeana*, *infra*.

† As in *Cælogyne barbata* and thence grouped with it under the sub-section *Proliferae*.

‡ Gard. Chron. XIX. (1853), p. 469.

C. fimbriata.

Rhizome scaly and much branched, spreading over a considerable space. Pseudo-bulbs ovoid-oblong, about the size of a filbert. Leaves linear-lanceolate, acute, 3—4 inches long, reflexed at the tip. Peduncles shorter than the leaves, one rarely two-flowered. Flowers an inch in diameter; sepals and petals pale dingy yellow, the former lanceolate, acute, the latter linear, reflexed; lip three-lobed, the side lobes erect, roundish, pale dingy yellow streaked obliquely with brown on the inner side, the middle lobe spreading, sub-quadrata with fimbriate margin, brown with a pale border; lamellæ two, fringed, deep brown, convergent at the apex. Column winged, yellowish.

Cœlogynæ fimbriata, Lindl. *Bot. Reg.* t. 868 (1825). Id. 1833, misc. No. 172.
Id. *Fol. Orch. Cœlog.* No. 29.

The first Cœlogynæ received alive in England, it having been sent from southern China by Mr. J. D. Parks to the Horticultural Society of London, in whose garden at Chiswick it flowered in 1824. Twenty-five years later it was detected by Sir J. D. Hooker and Dr. Thomson on the Khasia Hills in N. E. India, at 4,000 feet elevation, the Indian form differing slightly in colour from the Chinese type. For materials for description we are indebted to the Royal Gardens at Kew, where this Cœlogynæ has been in cultivation for some years past. The individual flowers are in attractive, but being produced freely in October and November, a large plant in full bloom at that season forms a pleasing object.

C. flaccida.

Pseudo-bulbs clustered, ovate-oblong, angulate, 2—3 inches long. Leaves petiolate, lanceolate, 7—10 inches long. Racemes slender, pendulous, 8—12 flowered, the rachis and pedicels pale reddish brown. Flowers 1½ inches in diameter; sepals and petals cream-white, the former oblong, acute, keeled behind, the latter linear-oblong; lip broadly ovate, three-lobed with three elevated, flexuous central lines, the lateral lobes white, streaked with red-brown on the inner side, the middle lobe acute, reflexed with a bright yellow blotch on the disk. Column winged, white above, red-brown beneath.

Cœlogynæ flaccida, Lindl. *Gen. et Sp. Orch.* p. 39 (1831). Id. *Fol. Orch. Cœlog.* No. 2. *Bot. Mag.* t. 3318. *Bot. Reg.* 1841, t. 31.

Discovered at Noakote, in Nepal, by Dr. Wallich, by whom it was introduced to British gardens about the year 1829. The flowers, which appear in the spring months, are slightly malodorous.

C. flavida.

Pseudo-bulbs ovoid, furrowed, 1—1½ inch long. Leaves linear-lanceolate,

acuminate, about 6 inches long, petiolate, leathery, deep green. Peduncles erect, shorter than the leaves, with about six hard imbricating distichous scales below the 5—7 flowered raceme. Flowers small, primrose-yellow, the lamellæ of the lip bright yellow; sepals ovate; petals linear; side lobes of lip oblong-obtuse, intermediate lobe oblong, reflexed; lamellæ two, large for the size of the flower. Column semi-terete, wingless.

Cœlogyné flavidæ, Hook. f. ex. Lindl. Fol. Orch. Cœlog. No. 24 (1854).

Discovered by Thomas Lobb on the Khasia Hills, and afterwards by Cathcart on the Sikkim Himalayas. Our description was taken from a plant recently received at Mentmore from Darjeeling. The presence of the hard imbricating scales below the raceme indicates its affinity to *Cœlogyné barbata* and *C. elata*, to both of which it is far inferior in a horticultural sense.

C. Foerstermanni.*

"Rhizome as thick as a condor's quill, covered with sepia-brown sheaths. Pseudo-bulbs cylindrate-fusiform, ribbed. Leaves oblong, acute, petiolate, 15—18 inches long. Peduncles longer than the leaves, sheathed at the base by numerous bracts, many flowered; floral bracts linear, apiculate, nearly equal to the stalked ovary. Flowers equal in size to those of *Cœlogyné Cumingii*; sepals and petals lanceolate, white, the sepals keeled behind; lip white with a yellow-brown stain on the disc, three-lobed, the side lobes rounded, the intermediate lobe elliptic, acute, with three denticulate, longitudinal keels."—Rchb. f. in Gard. Chron. I. s. 3 (1887), p. 798.

This is said to be of Sundaic (?) origin, and was introduced by Messrs. Sander and Co. through their collector Foerstermann.

C. fuliginosa.

Rhizome clothed with brown imbricating scales. Pseudo-bulbs subcylindric, angulate, 2—3 inches long, somewhat distantly placed on the rhizome. Leaves broadly lanceolate, acute, 5—7 inches long. Racemes shorter than the leaves, 2—3 flowered. Flowers, of which only one is expanded at one time, 2 inches across; sepals and petals light brownish white with a faint rosy tint, the former oval-oblong, the latter linear, reflexed; lip oblong, three-lobed, the side lobes oblong, erect, coloured like the sepals and petals, the middle lobe orbicular-oblong, fringed at the margin, deep red-brown, and furnished with two crisped, deep brown raised lines with a shallower one between them. Column clavate, slender, bent.

Cœlogyné fuliginosa, Lindl. in Loddiges' Catalogue. *Bot. Mag.* t. 4440 (1849).
Lindl. Fol. Orch. Cœlog. No. 31 (1854).

Introduced by Loddiges from Northern India, in 1838. Ten

* Not seen by us.

years later it was detected by Sir J. D. Hooker in the Sikkim Himalayas, on rocks in valleys at 5,000 feet elevation, and shortly afterwards by the same eminent botanist, in company with Dr. Thomson, near the summits of the Khasia Hills. The flowers vary in size and colour; the form figured in the *Botanical Magazine** had ochre-yellow flowers of a larger size than those described above, for which we were indebted to the Royal Gardens at Kew, where the species has long been in cultivation. Another plant in the Kew collection bears flowers with a deeper tinge of rose and the brown of the lip deeper and spread over a larger area. The narrow linear petals of this species bring it under Lindley's sub-section *Filiferæ*, its nearest allies being *C. fimbriata* and *C. ovalis*; the specific name, *fuliginosa*, "sooty," refers to the dusky front lobe of the lip.

C. fuscescens.

Pseudo-bulbs sub-cylindric, 3—4 inches long. Leaves oval-oblong, tapering at both ends, 7—10 inches long. Racemes nodding, shorter than the leaves, 5—7 flowered. Flowers not fully expanding, 2—2½ inches across vertically, of transparent texture, and of a pale orange-red colour; dorsal sepal oblong, acute, keeled behind, arching over the column; lateral sepals lanceolate, acute, and also keeled; petals linear; lip oblong, entire, the lateral margins incurved and bordered with red on the inner side, the apical half reflexed, the basal half traversed by three red raised plates which contract to thin converging lines towards the apex. Column clavate, arched.

Cœlogyne fuscescens, Lindl. Gen. et Sp. Orch. p. 41 (1831). Id. Fol. Orch. Cœlog. No. 26. Gard. Chron. III. s. 3 (1888), p. 168. Rolfe in Gard. Chron. III. s. 3 (1888), p. 168.

var.—brunnea.

Lip obscurely lobed, the lateral lobes spotted and margined with brown on the inner side; the apical lob chestnut-brown, paler towards the margin, the raised plates deep orange-red.

C. fuscescens brunnea, Lindl. Fol. Orch. Cœlog. No. 21. *Bot. Mag.* t. 5494. *C. brunnea*, Lindl. in Gard. Chron. 1848, p. 71. *C. assamica*, Rchb. *Xen. Orch. II.* p. 111, t. 134, 7, 8, 9.

As in the case of most of the species inhabiting the rich Cœlogyne districts in Northern India, *Cœlogyne fuscescens* was also one of the discoveries of Dr. Wallich, who detected it during his exploration of

* The figure in the *Botanical Magazine* represents the inflorescence with three expanded flowers, two of which were probably added by the artist, as we have no evidence of more than one flower being expanded at one time in this species.

the Nepalese Himalayas in 1827—8. Twenty years later it was gathered by Sir J. D. Hooker in Sikkim, and shortly afterwards on the Khasia Hills at 3,000 feet elevation. We find no record of the first introduction of the species into British gardens; it was in cultivation at the time Dr. Lindley compiled the monograph of the genus in his *Folia Orchidaceae*, and it has been occasionally imported since, specimens for identification having been received by us from various correspondents.

The variety *brunnea*, which is one of the handsomest of Cœlogynes, is stated to have been in cultivation at Syon House in 1844, and four years later Dr. Lindley mentions (*Gard. Chron.* 1848, p. 7) it as being in other collections, but afterwards became lost. It was reintroduced by Messrs. Low and Co., about the year 1864, from Moulmein, through the Rev. C. Parish.

C. Gardneriana.

Pseudo-bulbs cylindric-conical, 5—6 inches long, angulate when old. Leaves oblong-lanceolate, acuminate, 15—20 inches long, including the rather long petiole. Racemes shorter than the leaves, nodding, many flowered. Flowers close-set, not expanding, white with a citron-yellow stain on the lip; the short pedicels and ovaries sheathed by broad, inflated, sienna-brown bracts; sepals oblong, keeled, saccate at the base; petals narrower, linear-ligulate; lip narrowly oblong, bi-saccate at the base, three-lobed, the side lobes rotund in front, the intermediate lobe reflexed, bi-dentate at the tip, and traversed by three elevated lines, of which the outer two are wavy towards the apex.

Cœlogyne Gardneriana, Lindl. in Wallich's *Pl. asiat. rar.* I. 33. *Id. Gen. et Sp. Orch.* p. 41 (1831). *Id. Fol. Orch. Cœlog.* No. 1 (1854). *Paxt. Mag. Bot. VI.* p. 73 (1839). *Williams' Orch. Alb. IV.* t. 153.

Originally discovered by Dr. Wallich, and subsequently detected by Griffith and by Sir J. D. Hooker and Dr. Thomson on the Khasia Hills, whence it was introduced to Chatsworth in 1837, by Gibson, who found it "growing upon trees in moist shady woods, and especially in immediate proximity to a waterfall, by which it is constantly bedewed with spray." It flowered for the first time at Chatsworth, in December, 1838, the season in which it usually sends forth its graceful pendulous racemes of milk-white flowers in the glass-houses of Europe. It seems to have been subsequently lost, for no record of its being in cultivation occurred till about the year 1874, when the late Mr. Freeman collected it with *Vanda cœrulea* and other orchids from the Khasia Hills. The gibbous, almost

saccate base of the sepals, bi-saccate lip, and the nearly closed flowers clearly distinguish this from every other species of *Cœlogyne*, and constitute its sectional characters. It is named in compliment to Dr. George Gardner, who, during his travels in Brazil, 1836—41, made known to science for the first time many hundreds of plants, including some of the finest of the Brazilian orchids. Dr. Gardner was afterwards appointed Director of the Botanic Garden at Peradenia, in Ceylon, where he died in 1849 at the early age of 37.

C. graminifolia.

Rhizome scaly, the scales glossy blackish brown. Pseudo-bulbs ovoid, angulate, 2 inches long. Leaves linear, exceeding a foot in length, complicate at base, sub-acuminate, leathery, deep green. Scapes 4—6 inches long, sheathed at the base with hard, imbricating scaly bracts, 2—3 flowered. Flowers 2 inches in diameter, on pale orange-red pedicels, the ovaries ribbed and channelled; sepals and petals milk-white, the sepals oblong-lanceolate, the lateral two keeled behind; petals linear-lanceolate; lip shorter than the other segments, three-lobed, the side lobes oblong, with roundish angles, erect, white obliquely streaked with sepia-brown on the inner side; intermediate lobe sub-quadrata, reflexed, bright yellow bordered with white on the apical side; lamellæ 3, of which the middle one is the shallowest, all terminating in a blackish brown line in front. Column clavate, arched, pale orange-red.

Cœlogyne graminifolia, Parish and Rchb. in *Trans. Linn. Soc.* XXX. (1873), p. 146. *Bot. Mag.* t. 7006. Rolfe in *Gard. Chron.* III. s. 3 (1888), p. 168.

Discovered by the Rev. C. Parish, in Moulmein, in 1865—66; it also presumably occurs in Assam, and other districts in north-east India, it having been sent to the Royal Gardens at Kew, in 1887, from Shillong, on the Khasia Hills. It was, however, in cultivation in British gardens prior to that date, but from what source the plants were derived we find no record.

C. lentiginosa.

Pseudo-bulbs placed at intervals of $\frac{1}{2}$ —1 inch on a stout scaly rhizome, elliptic-oblong, 2—3 inches long, usually four-angled. Leaves oblong-lanceolate, acute, 6—8 inches long. Peduncles stoutish, erect, sheathed below with broad, convolute, green scales, loosely racemose above, about five flowered; bracts linear-oblong, exceeding the ovary. Flowers 1—1½ inches across; sepals and petals straw-yellow, the former elliptic-oblong, keeled behind, the latter linear-oblong; side lobes of lip rotund, white bordered and spotted with red-brown on the inner side, the intermediate

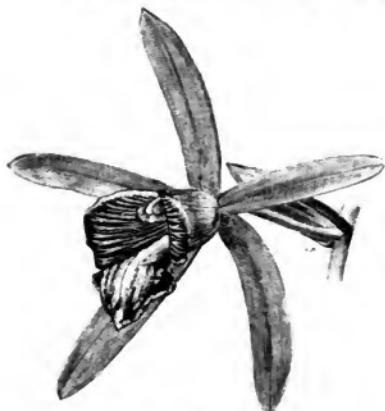
lobe broadly trowel-shaped, reflexed, orange-brown, bordered with white, and with three crenate keels, of which the middle one is the shortest.

Cælogyne lentiginosa, Lindl. Fol. Orch. Cælog. No. 4 (1854). *Bot. Mag.* t. 5958. Rchb. in Trans. Linn. Soc. XXX. p. 146.

First introduced by us from Moulmein, in 1847, through Thomas Lobb, and occasionally imported since from the same locality. Dr. Lindley described the species from dried flowers only, and from their resemblance to those of *Cælogyne flaccida* naturally placed it in the same section, *i.e.*, FLACCIDE, in which the racemes are pendulous; the peduncles are, however, erect, so that it belongs to the section ERECTE. Two forms are known distinguished by colour only; that described above, which we have assumed to be the type and which has straw-yellow sepals and petals and a bright orange blotch on the lip, and that figured in the *Botanical Magazine*, which has green sepals and petals, and is inferior in beauty to the other form.

C. Massangeana.

Pseudo-bulbs sub-pyriform, angulate, 3—5 inches long. Leaves stalked, elliptic-lanceolate, variable in size, the largest 15—20 inches long, and 4—6 inches wide at the broadest. Racemes quite pendulous, 18—24



Cælogyne Dayana.



C. Massangeana.

inches long, pale green with black pubescent hairs sparsely distributed over the rachis, many flowered; bracts hard, boat-shaped, red-brown, one-third as long as the pedicel and ovary. Flowers 2—3 inches in diameter; sepals and petals light buff-yellow, the former lanceolate-oblong, acute, keeled behind, the latter linear-oblong; lip broadly oval in outline, cordate at the base, three-lobed, the side lobes erect, whitish externally,

brown obliquely streaked with yellow on the inner side, the middle lobe quadrate with a fleshy verrucose brown and yellow disk, below which are three denticulate keels extending to the base of the lip. Column triquetral, bent.

Cœlogyne Massangeana, Rchb. in *Gard. Chron.* X. (1878), p. 684. *Fl. Mag.* n.s. t. 373. Williams' *Orch. Alb.* I. t. 29. *Bot. Mag.* t. 6979.

This species was first described by Reichenbach in the *Gardeners' Chronicle* for 1878, *loc. cit. supra*, but it had been in cultivation in several French and other continental collections many years prior to that date, under the name of *Cœlogyne assamica*, a name whose origin we have been unable to trace, but which may have been given in the belief that it was the species figured and described in Reichenbach's *Xenia Orchidacea* as *C. assamica*, a totally different plant which must be referred to Lindley's *C. fuscescens brunnea*. Although *C. Massangeana* is one of the most generally cultivated of epiphytal orchids, its native country is virtually unknown; it is reported to be a native of Assam, but the probability is great that it is of Malayan origin, like its nearest congeners, *C. asperata* and *C. Dayana*. It is dedicated to M. Massange de Louvrex, of Baillonville, near Marche, in Belgium, an enthusiastic amateur of orchids. It is one of the freest growing of Cœlogynes, and its long floral racemes, which appear at almost all seasons of the year, are developed with unusual rapidity.

C. ocellata.

Pseudo-bulbs sub-pyriform, $1\frac{1}{2}$ —3 inches long. Leaves narrowly lanceolate, acuminate, 7—10 inches long, narrowed towards the base into a short channelled petiole. Racemes erect, shorter than the leaves; 5 or more flowered, the bracts lanceolate acute, reddish brown, sheathing, longer than the ovaries. Flowers 2 inches in diameter; sepals and petals milk-white, the former oblong, acute, obscurely keeled behind, the latter linear-oblong; lip oblong, with entire margin three-lobed, white with some oblique orange lines on the inner side of the side lobes, also a yellow spot bordered with red at the apex, and 3—4 smaller ones at the base of the middle lobe; disk with three wavy keels that extend to the base of the lip, and a smaller one on each side of them on the middle lobe. Column slender, white bordered with orange.

Cœlogyne ocellata, Lindl. Gen. et Sp. Orch. p. 40 (1831). Id. Bot. Reg. 1839, misc. No. 25. Id. Fol. Orch. Cœlog. No. 18. *Bot. Mag.* t. 3767. *C. punctulata*, Lindl. Collect. Bot. sub. t. 33.

var.—maxima.

Plant larger in all its parts; racemes longer, 6—10 flowered. Flowers half as large again as in the type.

C. ocellata maxima, Rchb. in *Gard. Chron.* XI. (1879), p. 524. *Fl. Mag.* n.s. t. 365.

Originally discovered by Dr. Wallich, in' Sylhet, some time in the



Coelogyne ocellata maxima (flower nat. size).

third decade of the present century, but not introduced till 1838, when it was imported with other Indian orchids by Messrs.



Coelogyne ocellata maxima (raceme reduced).

Loddiges, in whose nursery at Hackney it flowered in the following

year. It was subsequently gathered by Thomas Lobb on the Khasia Hills, and by Sir J. D. Hooker on the Sikkim Himalayas at 7,000 feet elevation. The variety *maxima* was first brought into notice by Mr. B. S. Williams, of Holloway, in 1879; as seen in the collection of Baron Schroeder, at The Dell, it is not only far superior in beauty to the type, but it is one of the most attractive of orchids. *Cælogyne ocellata* is a variable species; several intermediate forms between the type and the variety *maxima*, as represented by Baron Schroeder's plant, differing only in the size of their flowers, have been observed in cultivation, and besides these there has appeared a variety in which the orange spots on the labellum are absent,* and another in which the spots are sulphur-yellow without the orange border.†

C. ochracea.

Pseudo-bulbs ovoid-oblong, four-angled above, $1\frac{1}{2}$ — $2\frac{1}{2}$ inches long. Leaves narrowly lanceolate, acute, 6—8 inches long, tapering below into a slender foot-stalk. Racemes shorter than the leaves, sheathed below by imbricating scales, 5—7 flowered; bracts lanceolate, longer than the ovaries, reddish brown, deciduous. Flowers nearly 2 inches in diameter, fragrant, milk-white, with some orange-yellow blotches and reddish streaks on the lip; sepals elliptic-oblong; petals linear-lanceolate; lip three-lobed, the side lobes erect, rotund, with denticulate margin in front, the middle lobe ovate-cordate, reflexed; disk with two toothed lamellæ. Column slender, dilated upwards.

Cælogyne ochracea, Lindl. *Bot. Reg.* 1846, t. 69. *Id. Fol. Orch. Cælog. No. 11. Bot. Mag.* t. 4661.

var.—*conferta*.

Pseudo-bulbs, leaves and flowers smaller in all their parts; in other respects agreeing with the species, except in the shorter-stalked ovaries.‡

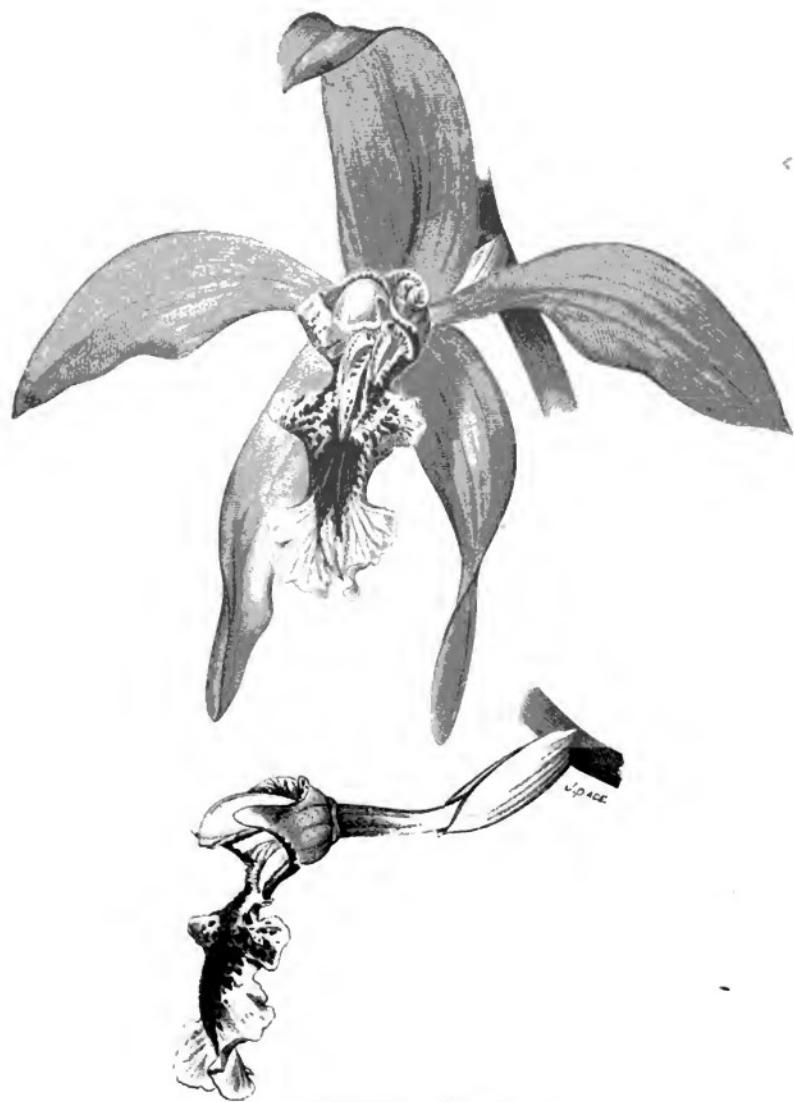
C. ochracea conferta, Rchb. in *Trans. Linn. Soc.* XXX. p. 146 (1873), sub-species, icon. xyl. t. 30. *C. conferta*, Parish et al. Rchb.

First detected by Dr. Griffith in Bhotan and the Khasia Hills, and introduced by Mr. Brocklehurst, of The Fence, near Macclesfield, about the year 1846. The variety *conferta* was first gathered by the Rev. C. Parish, in Moulmein, whence it has recently been

* *Cælogyne ocellata Boddaertiana*, Rchb. in *Gard. Chron.* XVIII. (1882), p. 776.

† This is believed by some to be the *Cælogyne nitida* of Lindley (*Fol. Orch. Cælog. No. 12*), and is in cultivation under that name.

‡ *Forsam propria species, sed characteres ad separandam speciem idonei nulli inpromptu, nisi forsitan ovaria pedicellata adeo brevia, quod tamen et dispositio loci explicari potest.*—Rchb. in *Trans. Linn. Soc.* loc. cit. supra.



Cologyne pandurata.
(Drawn in the Royal Gardens at Kew.)

sparingly imported; it is one of the most attractive of the small Cœlogynes. *Cœlogyne ochracea* is sometimes confused with *C. ocellata*, from which it may be distinguished by its shorter and broader leaves, by its deciduous bracts, and chiefly by the characters of the labellum, which has but two keels only, and the apical margin of the side lobes denticulate and not entire, as in *C. ocellata*.

C. odoratissima.

Pseudo-bulbs ovoid, furrowed, $\frac{3}{4}$ —1 inch long. Leaves linear-lanceolate, acute, $1\frac{1}{2}$ —3 inches long. Peduncles filiform, as long as the leaves, usually three flowered; bracts narrowly lanceolate, longer than the ovaries. Flowers about an inch in diameter, fragrant, white with a lemon-yellow blotch on the lip; sepals elliptic-lanceolate; petals narrower, nearly linear; lip obcordate, three-lobed with three longitudinal keels. Column elongated, semi-terete.

Cœlogyne odoratissima, Lindl. Gen. et Sp. Orch. p. 41 (1831). Id. Fol. Orch. Cœlog. No. 10. Bot. Mag. t. 5462. Thwaites' Pl. zeyl. p. 300. *C. angustifolia*, A. Rich. Ann. Sc. Nat. s. 2, XV. t. 6. Wight, Ic. Pl. Ind. or. t. 1641.

A native of the Neilgherry Hills in southern India, where it was detected by Dr. Wight, towards the middle of the present century, growing on the trunks and branches of trees, and flowering throughout the rainy season from May to October; it also inhabits the Newera Ellia and other elevated parts of the central province of Ceylon. It appears to have been first introduced to the Royal Gardens at Kew in 1863. It is a dwarf, tufted plant with fragrant flowers that may be cultivated in the cool house during the summer months.

C. pandurata.

Pseudo-bulbs from a stout creeping rhizome, oval oblong, compressed, 4 inches long. Leaves cuneate-oblong, 15—20 inches long. Racemes nearly as long as the leaves, pendulous, many flowered; bracts encullate, deciduous, as long as the pedicels and ovaries. Flowers among the largest in the genus, 4 inches across; sepals and petals similar and sub-equal, linear-oblong, acute, keeled behind, pale green; lip sub-panduriform, the side lobes erect, yellow-green streaked with black, the middle lobe crisped and covered with black warty asperities and traversed by two longitudinal toothed keels.

Cœlogyne pandurata, Lindl. in Gard. Chron. 1853, p. 791. Id. Fol. Orch. Cœlog. No. 7. Bot. Mag. t. 5084. Rchb. Xen. Orch. II. p. 80, t. 121. Van Houtte's Fl. des Serres, XX. t. 2139 (copied from Bot. Mag.) Williams' Orch. Alb. II. t. 63.

Discovered by Sir Hugh Low in 1852, in Sarawak, where it is not uncommon, always growing in the hottest jungles on the trunks of trees in the swampy lowlands adjacent to the coast and river banks,

places that are almost inaccessible during the rainy season. *Cælogynæ pandurata* flowered for the first time in this country in Messrs. Loddiges' nursery at Hackney, in 1853; it is one of the most remarkable of orchids, the unusual colour of its large flowers rarely failing to arrest the attention of the beholder.

C. Parishii.

Pseudo-bulbs oblong, obscurely four-angled, 4—6 inches long. Leaves narrowly elliptic-oblong acute. Peduncles from the apex of the pseudo-bulbs, sheathed at the base by 6—8 imbricating scales, racemose above, usually five flowered. Flowers 2 inches in diameter, pale yellow-green, the lip spotted with black; sepals lanceolate, acuminate, keeled behind; petals linear-lanceolate; lip panduriform, the anterior lobe apiculate, with undulate margin and with five fringed raised lines on the disk, two of which are prolonged to the base of the lip. Column semi-terete, bent.

Cælogynæ Parishii, Hook. *Bot. Mag.* t. 5323 (1862).

Sent to Messrs. Low and Co. in 1861, from Moulmein, by Rev. C. Parish. It is a curious and distinct species, having some resemblance to *Cælogynæ pandurata*, but with very differently-shaped pseudo-bulbs, from the summit of which the inflorescence is produced, and not from the base as in that species; it differs also from *C. pandurata* in the size of the flowers and especially in the structure of the labellum, the anterior lobe of which is shorter and broader in proportion to the length, and has five fringed keels on the disk in the place of the warty crest of *C. pandurata*.

C. Rossiana.

Pseudo-bulbs ovoid or sub-pyriform, much furrowed when old, variable in size in the cultivated plant, the largest 2—3 inches long. Leaves lanceolate, acuminate, 10—12 inches long, narrowed below into a slender petiole, coriaceous. Racemes erect, shorter than the leaves, 7—10 flowered. Flowers 1½—2 inches in diameter; sepals and petals milk-white, keeled behind, the former narrowly oblong, acute, the latter linear; lip broadly oval, obscurely lobed, the erect side lobes red-brown on the inner side, the front lobe bright yellow, the disk and space between the side lobes white traversed by three longitudinal crenulate keels. Column clavate, slender, bent.

Cælogynæ Rossiana, Rehb. in *Gard. Chron.* XXII. (1884), p. 808. Rolfe in *Gard. Chron.* VI. s. 3 (1889), p. 650.

Imported from Burmah in 1884 by Mr. H. J. Ross, of Castagnolo, near Florence. We are indebted to the Royal Gardens at Kew for materials for description.

C. Sanderiana.

Pseudo-bulbs ovoid, 2—3 inches long, obscurely angulate, much wrinkled when old. Leaves oblong-lanceolate, petiolate, acute, 12—15 inches long, 2—3 inches broad. Racemes pendulous, as long as the leaves, 5—7 or more flowered, the short stalked ovaries sheathed by a pale brown, acute, deciduous bract. Flowers among the handsomest in the genus, $3\frac{1}{2}$ — $4\frac{1}{2}$ inches across when spread out; sepals and petals milk-white, the former lanceolate, acuminate, keeled behind, the latter similar but narrower; lip three-lobed, the side lobes oblong, erect, crisped at the front margin, streaked with red-brown on the inner side, and with a yellow blotch at the crisped front edge; the intermediate lobe oblong acute, reflexed and undulate, and with a bright yellow disk on which are six raised fringed lines. Column triquetral, arched, winged.

Ceologyne Sanderiana, Rehb. in *Gard. Chron.* I. s. 3 (1887), p. 764.

One of the most recent additions to the genus, and at the same time one of the most beautiful species in it. It was introduced by Messrs. Sander and Co., through their collector Förstermann, in 1887. Its habitat has not been divulged.

C. Schilleriana.

Pseudo-bulbs clustered, small, somewhat flask-shaped, diphyllous. Leaves oblong-lanceolate, acuminate, 4—5 inches long, narrowed below into a short petiole invested with imbricating scales. Peduncles from between the leaves, short, one flowered. Sepals and petals greenish yellow, the former lanceolate, acute, the latter linear; lip obovate-oblong, three-lobed, the side lobes erect, cream-white with a red-brown stripe near the margin, and numerous anastomosing red-brown lines below it; front lobe spreading with dentate margin, light yellow spotted with red-purple; disk with three raised lines that extend to the base of the lip. Column semi-terete.

Ceologyne Schilleriana, Rehb. in *Berl. Allg. Gartenz.* 1858, p. 189. *Id. Xen. Orch. II.* p. 110, t. 134. *Bot. Mag. t. 5072.* Van Houtte's *Fl. des Serres*, XXII. t. 2302.

Introduced by our Exeter firm, from Moulmein, in 1857, through Thomas Lobb, and dedicated to Consul Schiller, of Hamburg, at that time the most prominent amateur of orchids in Germany. It was placed by the late Professor Reichenbach under *Pleione*, to which it does not conform. It is still occasionally met with in collections, where it is easily recognised, even when not in flower, by its minute, clustered, generally leafless pseudo-bulbs.

C. sparsa.

A dwarf tufted plant. Pseudo-bulbs ovoid, varying in size from that of a filbert to a walnut. Leaves oblong-lanceolate, acuminate, 6 inches

long, with three prominent nerves. Peduncles erect, slender, shorter than the leaves, 3—5 flowered. Flowers not fully expanding, white with an orange blotch on the middle lobe of the lip, and some brown spots and markings on the side lobes; sepals and petals keeled behind, the former lanceolate, acute, the latter linear; side lobes of lip oblong, intermediate lobe sub-quadratae, with three raised lines on the disk. Column winged and hooded.

Cœlogyne sparsa, Rchb. in *Gard. Chron.* XIX. (1883), p. 306.

A pretty floriferous dwarf species, introduced by Messrs. Sander and Co. from the Philippine Islands in 1882, through their collector Roebelen. The specific name *sparsa*, "sown or scattered," refers, according to its author, to the spotted side lobes of the lip.

C. speciosa.

Pseudo-bulbs ovoid, angulate, 1½—3 inches long, monophyllous. Leaves oblong-lanceolate, acute, 9—15 inches long, with 3—5 prominent nerves, and narrowed below into a stoutish winged petiole. Peduncles short, sheathed by 4—6 imbricating bracts, usually two-flowered. Flowers among the largest in the genus, with pedicel and ovary very short, ribbed and twisted; sepals and petals 2 inches long, pale yellow-brown, the former oblong, acute, and keeled behind, the latter linear; lip larger than the other segments, nearly oblong in outline, three lobed, and traversed longitudinally by two fringed crests, the side lobes erect, entire, pale brown externally, clouded and reticulated with deep brown on the inner side, as is the space between the fringed crests; the front lobe white, slightly reflexed, denticulate, undulate and with a shallow sinus in the apical margin. Column clavate, bent, winged, whitish.

Cœlogyne speciosa, Lindl. Gen. et Sp. Orch. p. 39 (1831). Id. Fol. Orch. Colog. No. 27 (1854). *Bot. Reg.* 1847, t. 23. *Bot. Mag.* t. 4889. *C. salmonicolor*, Rchb. in *Gard. Chron.* XX. (1883), p. 328. *Chelonanthera speciosa*, Bl. *Bijdr.* p. 384 (1825).

var.—*albicans*.

Flowers larger than in the type, the lip being 3 inches long; sepals and petals light yellowish green; lip white, the front lobe very pure, the side lobes freckled with red-brown on the inner side and between the fringed crests. Column white.

C. speciosa albicans, supra.

This remarkable *Cœlogyne* was first detected by the Dutch botanist Blume, in the early part of the present century, on the Salak Mountains, in Java, at an elevation of 3,000—5,000 feet, and who published a description and drawing of it in his *Bijdragen* (Contributions to the Flora of Dutch India), under the name of *Chelonanthera speciosa*, a name that no longer has a place in orchid nomenclature, the genus *Cœlogyne*, to which the plant unquestionably

belongs, having been founded by Lindley two years previously on the well-known *C. cristata*. It was first introduced into European gardens by our Exeter firm in 1846, through Thomas Lobb, who gathered it in the locality in which it had been first discovered by Blume. As a species it is slightly variable in the size and colour of its flowers, the most distinct deviation from the type as figured in the *Botanical Register* for 1847, that is known to us being the variety described above, which appeared amongst a recent importation brought to one of the London sale-rooms.

The minute hairs forming the fringe of the crest of the lip are among the most beautiful microscopic objects imaginable, and which must be seen to be appreciated. These hairs are sometimes simple, sometimes dichotomously branched, but in every case are terminated by a cluster of unicellular stellate expansions of even greater delicacy than the pappus of many Composites.

C. testacea.

"Pseudo-bulbs oblong-ovate, varying in size, compressed and angled. Leaves broadly lanceolate, acute, petiolate, with three principal ribs. Racemes clothed with leafy imbricated scales at the base, drooping, bearing 8—10 sub-distichous flowers; bracts large, ovate, brown, concealing the ovary. (Flowers 1—1½ inches across vertically); sepals and petals nearly uniform, oblong-lanceolate, obtuse, sometimes apiculate, pale clayey white, sub-patent; lip broad-oblong, recurved, three-lobed, white spotted and blotched with brown, the side lobes rounded, short; terminal lobe very obtuse, slightly waved, having four elevated lines fringed with glandular hairs. Column terete, compressed, dilated and winged on each side above."—*Botanical Magazine*.

Ceologyne testacea, Lindl. in Bot. Reg. 1842, misc. 34. Id. Fol. Orch. Cœlog. No. 3. *Bot. Mag.* t. 4785.

Introduced by Messrs. Loddiges from Singapore, in 1841. It was in cultivation in the Royal Gardens at Kew thirteen years later, but seems to have disappeared from British collections shortly afterwards, and we find no record of its having been re-introduced since. It is surpassed in attractiveness by its near congeners, *Caelogyne Massangeana* and *C. Dayana*.

C. tomentosa.

Pseudo-bulbs ovoid, elongate, 2—3 inches long, of a dull deep pea-green colour. Leaves petiolate, variable in shape, 9—12 inches long, the broader ones obovate-lanceolate, with 3—5 prominent nerves, the narrower

ones oblanceolate, acute. Racemes pendulous, the rachis and pedicels roughly tomentose, reddish brown, and bearing 15—20 flowers; bracts oblong-acute, shorter than the ovaries. Flowers 2—2½ inches in diameter; sepals and petals light orange-red, the former lanceolate, acute, keeled behind, the latter linear-lanceolate; lip obovate in outline, three-lobed, the side lobes erect, oblong, rounded in front, white streaked obliquely with red on the inner side; the intermediate lobe sub-quadrata, apiculate, traversed by three toothed keels that extend to the base of the lip. Column clavate, arched, winged above the middle, whitish.

Cœlogyne tomentosa, Lindl. Fol. Orch. Cœlog. No. 5 (1854). Rchb. in Gard. Chron. 1873, p. 843.



Cœlogyne tomentosa.

Cœlogyne tomentosa was first described by Dr. Lindley, in 1854, from an herbarium specimen at Kew, gathered a few years previously by Thomas Lobb, who gave no locality. Nothing more was known of it till 1873, in which year it flowered in the collection of Mr. A. D. Berrington, at Pant-y-Goitre, near Abergavenny, who had received it from Borneo, whence it has been occasionally but very sparingly imported since. The tomentose rachis and dark-coloured flowers clearly distinguish this species from its congeners, among which it is one of the handsomest.

SUB-GENUS PLEIONE.

Pleione, Don. Prod. Fl. Nep. p. 36 (1825).

The Pleiones are alpine plants inhabiting the lower and middle Himalayan zones, where they have a vertical range of 2,500—10,000 feet, also the summits of the Khasia Hills, and the mountains of Arracan and Moulmein at 3,000—7,000 feet elevation. Most of the

species are abundant in their respective habitats growing on moss-covered rocks and banks, and covering the lower part of the trunks of lofty trees, sometimes in partial shade, sometimes fully exposed. As horticultural plants they are highly valued on account of the brilliant effect produced by masses of their delicately-coloured flowers in the autumn and winter months; the flowers are, however, of comparatively short duration. Besides the species described in the sequel, two others are still imperfectly known to science, *Cælogynæ* (*Pleione*) *diphylla*, and *C. (Pleione) javanica*, the first gathered by Griffith on the Khasia Hills, and the second by Zöllinger near Tijkoya, in Java. The Pleiones are familiarly known as "Indian Crocuses."

The following characters are common to all the cultivated species :—

The *pseudo-bulbs* are clustered, of small size, often of peculiar form and sometimes mottled with black; they are of annual duration only.

The *leaves* are solitary and deciduous in most of the species,* falling off before the flowers are developed.

The *peduncles*, one or two from the base of each pseudo-bulb, are enclosed in imbricating bracts of which the upper one is the longest, and which soon shrivels, leaving the peduncle naked; they are one sometimes two flowered; the flowers, especially the labellum, are of brighter and more delicate tints that are seen in the true Cœlogynes.

The *sepals* and *petals* are narrow and spreading; the lip nearly oblong when spread out, more or less rolled over the column at the base and traversed longitudinally by 5—7 fringed keels.

The structure of the flower of *Pleione* is, however, essentially that of *Cœlogynæ*, and presents no character whatever by which the two may be generically separated.

Cultural Note.—The Pleiones in their native habitats live under climatic and other conditions† which, with the exception of temperature,

* In *Cœlogynæ Hookeriana* the leaves persist till after the fading of the flowers.

† In whatever locality the Pleiones are found wild, the temperature of that locality has what in gardening phraseology is called an intermediate range, and which varies according to the altitude of the locality. Thus the temperature of the Himalayan zone at the lower limits of the Pleiones ranges from 18°—27° C. (65°—80° F.), while at the higher limits in the *Pleione humilis* and *P. Hookeriana* localities the range is 5°—8° C. (10°—15° F.) less, which is very nearly the summer temperature on the summits of the Khasia Hills, the winter temperature being somewhat lower. On the Arracan Mountains, at the altitude at which *P. Reichenbuechiana* grows, Colonel Benson estimated the average temperature at 18°—21° C. (65°—70° F.)—(Gard. Chron. 1870, p. 796). The hygrometric condition of all these localities is excessive compared with the climate of England. In Sikkim the atmosphere is at or near the saturation point during six months of the year, the other six months are nearly rainless; on the Khasia Hills the rainfall is one of the heaviest known, and on the mountains of Arracan and Moulmein it ranges from 200 to 250 inches annually; the dry season lasts about three months (December—February); vegetation is then dormant.

cannot be even approximately imitated artificially; the cultural routine here formulated is thence, in a great measure, founded upon experience derived from observation of the behaviour of the plants under the altered conditions of their environment in the glass houses of Europe.

The pseudo-bulbs should be re-potted about a fortnight after they have flowered, that is to say, set in shallow pans in a compost of two-thirds fibrous peat, and one-third chopped sphagnum, to which a little leaf-mould and sand should be added.* The pans should be filled to one half of their depth with broken crocks, for drainage, upon which it is usual to place a layer of sphagnum for the two-fold purpose of keeping the compost damp and preventing its sifting through the drainage. The remainder of the pan should be filled to within half an inch of the rim with compost, in which the bulbs should be placed with their roots half an inch below the surface; the spaces between the bulbs, and between them and the rim should be covered with living sphagnum for retaining moisture. The pans should then be suspended near the roof-glass of any house in which an intermediate temperature is maintained, and water withheld till the plants commence growing, or given only in sufficient quantity to keep the surface sphagnum alive. As the roots and foliage develop, the waterings must be more frequent and more copious, and may be supplemented occasionally by a little weak liquid manure. *Pleione layenaria*, *P. præcox* and its variety *Wallichiana* may then have a light position in the Cattleya house. *P. Reichenbachiana* and *P. maculata* require a little more heat. *P. humilis* and *P. Hookeriana*, coming from a high alpine region, should be placed close to a ventilator, or in a cooler house. When the foliage begins to turn yellow, the waterings must be diminished in frequency and quantity till only sufficient is given to keep the bulbs plump. While in flower, the Pleiones may be kept in the Cattleya house or in the cool house, provided the temperature at no time descends below 7° C. (45° F.)

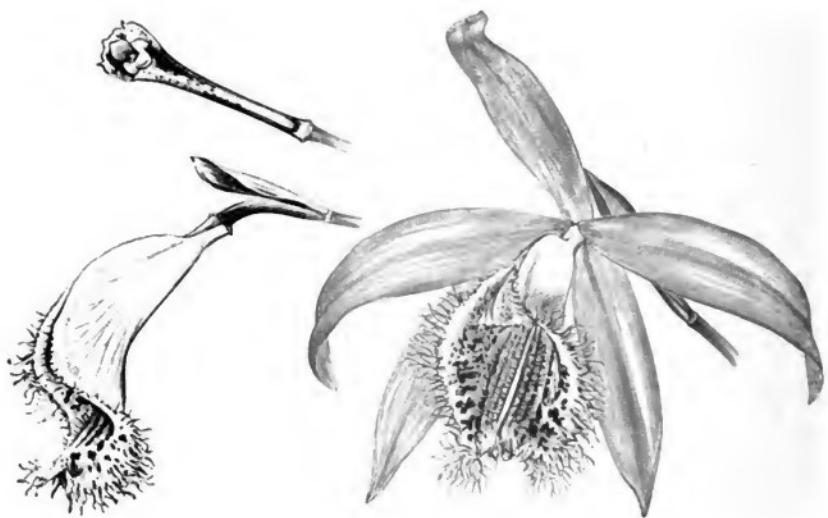
Cœlogyne (Pleione) Hookeriana.

"Pseudo-bulbs ovoid, smooth, $\frac{1}{2}$ —1 inch long. Leaves 1—2 inches long, elliptic-lanceolate, acuminate, finely plaited. Flowers 2— $2\frac{1}{2}$ inches across the petals, rose-purple with a paler lip blotched at the apex with brown-purple; sepals and petals variable in breadth, elliptic-lanceolate, acuminate, spreading; lip convolute and cylindric as far as the lateral lobes extend, then expanded into a small, retuse, terminal lobe; disk with several slender crested lamellæ. Column slender, expanded at the tip."

—*Botanical Magazine*.

Cœlogyne Hookeriana, Lindl. Fol. Orch. Cœlog. No. 37 (1854). *Bot. Mag.* t. 6388.

* Some cultivators prefer a smaller proportion of peat, and substitute fibrous loam with a small quantity of dried cow manure.



Cœlogyné (Pleione) humilis.

var.—brachyglossa.

Lip shorter and more open than in the type, white with a light yellow disk on which are some brown spots; sepals and petals pale rose.

C. Hookeriana brachyglossa, Rchb. in *Gard. Chron.* I. s. 3 (1887), p. 838.

Discovered in 1849—50 by Sir J. D. Hooker, in the Sikkim Himalayas, at elevations ranging from 7,000 to 10,000 feet, and where it is common on mossy banks. Two varieties were recognised by the discoverer, distinguished from each other by the form of their labellum, one occurring in the lower part of the range of the species (7—8,000 feet), and the other in the higher part (9—10,000 feet). That described and figured in the *Botanical Magazine*, which may be regarded as the type, is from the lower range, and was introduced in 1877 by Mr. Elwes, the author of the splendid monograph of the genus *Lilium*. The other, from the higher range, is a more recent introduction, and was named *brachyglossa* by the late Professor Reichenbach, from materials supplied to him from the rich collection of Sir Trevor Lawrence, Bart., at Burford Lodge.

C. (*Pleione*) *humilis*.

Pseudo-bulbs flask-shaped, 1—2 inches long, ribbed, deep green. Leaves oblanceolate, acuminate, 6 inches long. Flowers 2—3 inches across; sepals and petals linear-lanceolate, white tinted with pale lilac; lip oval-oblong, convolute at the base into a short tube, open in front, emarginate and fringed with long white hairs; disk with 6—8 fringed veins, between which are amethyst-purple lines, the marginal area white spotted with amethyst-purple. Column slender, clavate, winged, bent near the apex.

Cologyne humilis, Lindl. Gen. et Sp. Orch. p. 43 (1831). *Fol. Orch. Cælog.* No. 41 (1854). *Bot. Mag.* t. 5674. *Pleione humilis*, Don. Prod. Fl. nep. p. 37 (1835). *Paxton's Fl. Gard.* II. t. 51.

sub-vars.—*albata* (*Gard. Chron.* III. s. 3 (1888) p. 392), flowers white with light purple radiating lines and two orange spots on the lip; *tricolor* (*Williams' Orch. Alb.* III. t. 102), the lines between the fringed veins of the lip orange-brown, the marginal area spotted with the same colour, and with two yellow stains near the apex.

Native of Nepal, Sikkim and Bhotan, at 7,000—8,000 feet elevation, growing among moss in shady places, and sometimes on the lower parts of the trunks of lofty trees; also of the Garraw and Khasia Hills. It was originally discovered at the beginning of this century by Dr. Buchanan Hamilton in the first named region, and subsequently it was gathered by Griffith near Santagong in Bhotan.

It was first introduced into British gardens by our Exeter firm, along with *Pleione lagenaria*, in 1849, through Thomas Lobb, who found it at Sanahda, on the Khasia Hills.

The sub-variety *albata*, which differs from the type in colour only, was imported by Messrs. Sander and Co. in 1887; and *tricolor*, a very distinct and handsome form as regards colour first appeared in Mr. W. Bull's horticultural establishment in 1880. The flowering season of *P. humilis* is January—February.

C. (*Pleione*) *lagenaria*.

Pseudo-bulbs about an inch long, somewhat bottle shaped with a rounded protuberance nearly midway between the base and the apex, green mottled with blackish brown. Leaves narrowly oblanceolate, 7—10 inches long. Flowers 2—3 inches across; sepals and petals narrowly lanceolate, rose-lilac; lip oblong, emarginate, the basal half convolute over the column, pale rose-lilac externally, striped with purple on the inner side; the distal half open with undulate margin, purple



Cœlogyne (Piclone) lagenaria.

with paler transverse streaks and blotches and with a white margin; disk yellow and red with five longitudinal fringed lines. Column clavate, winged at the apex.

Cœlogyne lagenaria, Lindl. Fol. Orch. Colog. No. 89 (1854). *Bot. Mag.* t. 5370. *Illus. hort.* 1867, t. 510. Van Houtte's *Fl. des Serres*, XXIII. t. 2386. *Pleione lagenaria*, Lindl. in Paxt. *Fl. Gard.* II. t. 39 (1851). Warner's *Sel. Orch.* I. t. 17. Jennings' *Orch.* t. 47. De Puydt, *Les Orch.* t. 36.

Introduced by our Exeter firm in 1849, through Thomas Lobb, who discovered it on the Khasia Hills, where it is said to be re-

stricted to one or two localities of very limited extent. Ever since its introduction it has been in the highest repute amongst orchid amateurs on account of its beautiful flowers that are produced in October and November. The specific name, from *lagena*, a kind of jug or flagon, refers to the form of the pseudo-bulbs.

C. (Pleione) maculata.

Pseudo-bulbs nearly bottle-shaped, fully an inch long, the basal two-thirds cylindric, the apical third conic. Leaves lanceolate, acute, plicate, 6—9 inches long. Peduncles short, sheathed at the base by small greenish scales, and above them by a larger membranous bract, one flowered. Flowers 2 inches in diameter; sepals and petals spreading, similar and sub-equal, lanceolate, acute, white; lip oval-oblong, three-lobed, the side lobes narrow, erect, white streaked obliquely on the inner side with purple, the middle lobe spreading, undulate, with five fringed longitudinal lamellæ that extend to the base of the lip, white with large purple marginal spots and yellow disk. Column slender, terete, white.

Oeologyne maculata, Lindl. Gen et Sp. Orch. p. 43 (1831), and in Wall. *Pl. Asiat. rar.* t. 53. Id. *Fol. Orch. Cœlog.* No. 40. *Bot. Mag.* t. 4691. Van Houtte's *Fl. des Serres*, XIV. t. 1470 (copied from Bot. Mag.) *Pleione maculata*, Lindl. in Paxt. *Fl. Gard.* II. t. 39 (1851).

var.—Arthuriana.

Pseudo-bulbs angulate, smaller than in the type. Flowers also smaller with purple lines on the petals, and with a continuous purple band around the front margin of the lip.

C. maculata Arthuriana, supra. *C. (Pleione) Arthuriana*, Rchb. in *Gard. Chron.* XV. (1881), p. 40.

Discovered by Dr. Wallich towards the end of the second decade of the present century on the Khasia Hills, whence it was introduced by our Exeter firm along with the preceding species, in 1849, through Thomas Lobb. In the following year it was detected by Sir J. D. Hooker and Dr. Thomson, also on the Khasia Hills at 4,000—5,000 feet elevation, and in 1852 it was sent to the Royal Gardens at Kew, from Assam, by Simons. It also occurs in Sikkim at 2,500—3,000 feet elevation. The variety *Arthuriana* was sent to us in 1881 by a correspondent at Rangoon, who gave no locality, and was dedicated by Professor Reichenbach to the memory of the late Mr. Arthur Veitch. The flowering season of *Pleione maculata* is October and November.

C. (Pleione) præcox.

Pseudo-bulbs broadly flask-shaped, about an inch in diameter, warty, mottled green and blackish brown. Leaves broadly lanceolate, 9—12

inches long, plaited and petiolate. Peduncles one- sometimes two-flowered. Flowers 3 inches across vertically; sepals and petals light rose-purple, the former lanceolate, acute, the latter linear; lip oval-oblong, three-lobed, the side lobes convolute over the column, pale rose colour, the front lobe sub-quadratae with fringed margin, and coloured like the sepals and petals, with a bright yellow disk on which are five denticulate lamellæ. Column slender, with two notched wings at the apex.

Cœlogyne præcox, Lindl. Gen. et Sp. Orch. p. 49 (1831). Id. Fol. Orch. Cœlog. No. 42. Paxt. Mag. Bot. XIV. p. 7. *Pleione præcox*, Don. Prod. Fl. nep. p. 37 (1825).

var.—Wallichiana.

Peduncles usually one-flowered. Flowers of a deeper colour and with the veins of the sepals, petals, and convolute lobes of lip usually more



Cœlogyne præcox Wallichiana.

distinctly marked; the front lobe of the lip dentate rather than fringed, and the teeth of the lamellæ of the disk shorter than in the type.

C. præcox Wallichiana, Lind. Fol. Orch. Cœlog. No. 42 (1854). *C. Wallichiana*, Bot. Reg. 1840, t. 24. Bot. Mag. t. 4496. *Pleione Wallichiana*, Lindl. in Paxt. Fl. Gard. sub. t. 51 (1851). *P. præcox Wallichiana*, Jennings' Orch. t. 47. *P. birmanica*, Rchb. in Gard. Chron. XVIII. (1882), p. 840.

First discovered by Dr. Wallich in Sylhet and on the Khasia Hills, where it was collected by Gibson and sent by him to Chatsworth

in 1837. It was found by Sir J. D. Hooker in great abundance during his exploration of the Sikkim Himalayas in 1849—50, on the ascent to Darjeeling, and on the Tonglo at 9,000 feet elevation, growing "on the trunks of all the great trees, attaining a higher elevation than most other epiphytal species,"* and again subsequently on the Kollong Rock, "a steep dome of red granite that rises 400 feet above the level of the surrounding ridges of the Khasia Hills,† and also on the rocks about Nonkreem.‡ Twenty years later the variety was detected by Colonel Benson on the Arracan Mountains at 2,500—3,000 feet elevation. The range of the species is therefore very considerable; its flowering season in the glass houses of Europe is November and December.

C. (*Pleione*) *Reichenbachiana*.

Pseudo-bulbs 2—2½ inches, cylindric, lobed, and with a conical protuberance at the apex, green spotted and mottled with blackish brown. Peduncles one- rarely two-flowered. Flowers 2 inches across vertically; sepals ligulate, light rosy lilac striated and stained with amethyst-purple in the middle and towards the apex; petals narrower and paler in colour; lip oblong, emarginate, the basal half rolled over the column, white, the distal half open with ciliate margin, white spotted with purple; disk with three fringed lamellæ. Column slender with three notched wings at the apex.

Caelogyne (Pleione) Reichenbachiana, T. Moore in Gard. Chron. 1868, p. 1210.
Bot. Mag. t. 5753.

Discovered by Colonel Benson on the mountains near Moulmein, at 6,000—7,000 feet elevation, and communicated by him to the Royal Gardens at Kew and to us in 1868. It flowers in February and March, but it is still very rare in European collections. It was dedicated at our request to the late Professor Reichenbach of Hamburgh.

CALANTHE.

R. Brown in Bot. Reg. 1821, sub. t. 573. Lindl. Gen. et Sp. Orch. p. 249 (1833). Benth. et Hook. Gen. Plant. II. p. 520 (1883).

Limited as is the number of species of Calanthe suitable for horticulture, the genus has, nevertheless, an especial interest for horticulturists on account of some beautiful forms included in it, that supply an uninterrupted succession of flowers during the winter months, and

* Himalayan Journals, I. p. 166.

† Id. II. p. 29. ‡ Id. II. p. 311.

which have been greatly multiplied during the past few years by means of hybridisation.

The genus as at present circumscribed includes about forty species that are widely distributed over the tropical and sub-tropical regions of the Eastern hemisphere, and occurring also very sparingly in Mexico, Central America, and the West Indies. The Calanthes are most numerous along the lower Himalayan zone from Assam to Nepal, and again in Java and the neighbouring islands. Northwards they spread into Japan, whose flora includes four or five species, and southwards as far as Sydney in New South Wales, which is the southern limit of *C. veratrifolia*. The genus is represented in South Africa by the beautiful *C. natalensis*, in Mauritius by *C. sylvatica*, in the Society and probably other islands of the Pacific Ocean by *C. gracillima*.

The essential characters of Calanthe consist chiefly in the labellum being almost always spurred, three-lobed, with the middle lobe notched, and its claw being adnate to the column, forming either a cylindric tube, or a broadly turbinated cavity beyond which the column is very rarely produced. The pollinia are eight, in groups of four each; each group is furnished with a short caudicle or bipartite gland.*

Dr. Lindley distributed the Calanthes into two sections, "according as the spur of the labellum is elongated, or short or quite obsolete, but the distinction is vague, and not confirmed by more recent observation."† A more natural sectional division may be made by separating the epiphytal or sub-epiphytal species of which *C. vestita* is a well-known type, from the terrestrial species of which *C. veratrifolia* is one of the best known representatives. The most obvious characteristics of each section may be thus stated:—

VESTITÆ. Pseudo-bulbs more or less elongated, angulate, covered with a grey-green reticulated, membranous sheath. Leaves large, plicate, deciduous. Inflorescence hairy, loosely racemose; bracts usually large, inflated and as long as the ovaries.

To this section belongs *Limatodes rosea*, Lindl. and *L. labrosa*, Rchb.; also *L. gracile*, Lindl. not in cultivation; these differ from *Calanthe vestita* chiefly in the base of the lip not being adnate to the column, although enfolding it. The typical *Limatodes pauciflora* of Blume, and one or two other species, none of which are in cultivation, are now referred to Phaius.

* The appendages or caudicles of the pollinia resemble the stipes of the Vandæ, but they evidently develop from the pollen itself, and not from the rostellum.

† Bentham in Jour. Linn. Soc. XVIII, p. 309.

VERATRIPOLLE. Pseudo-bulbs none, or a very small, fleshy or tuberous rhizome, emitting long cord-like branched roots. Leaves broad and spreading, persisting longer than one year. Inflorescence densely racemose or corymbose-racemose; bracts small, appressed, much shorter than the ovaries.

Besides the manifest differences in the vegetative organs of the two sections noted above, there is another well-marked distinction between them of considerable horticultural importance that has been brought out by the experiments of the hybridist. These experiments go far to prove that while the species of the **VESTITE** group cross freely with each other and with the mules resulting from such crosses, and while, so far as the experiments have been carried, the cultivated species of the **VERATRIPOLLE** will also cross with each other, no species or mule belonging to one of the sections can be induced to cross with any species or mule belonging to the other.

It is a remarkable fact, too, which has been already referred to under *Phaius*, that bi-generic hybrids have been raised between *Phaius grandifolius* and some of the forms of *Calanthe vestita*, thus proving the two genera to be very nearly allied, which was indeed surmised to be the case long ago by Dr. Lindley, and even by Griffith before him.* This fact indicates plainly that in the systematic arrangement of the genera, *Phaius* and *Calanthe* should come closer together than they are usually placed in the best synopses of the Orchidæ, or at least that they should be brought under the same sub-tribe; but the reduction of *C. vestita* to *Phaius vestitus* as proposed by Reichenbach† because mules have been obtained between that species and a *Phaius* does not appear to us to be at all justifiable.

The genus *Calanthe* was founded by Dr. Robert Brown on *Calanthe veratrifolia*, with which he became acquainted while investigating the flora of Australia. The name means simply "beautiful flower," from καλός (kalos) and ἄνθος (anthos).

Cultural Note.—VESTITE. The species and hybrids comprising this group should be potted as soon as they begin to start into growth in early spring. In removing the pseudo-bulbs from the pots the exhausted soil should be shaken out and the old roots cut off; the pseudo-bulbs should then be re-potted in a compost of two-thirds fibrous loam and one-third peat with the addition of a little sand to assist drainage. If good fibrous loam is not procurable, a compost of three-fourths fibrous peat and one-fourth sphagnum moss may be substituted with the addi-

* Fol. Orch. *Calanthe*, p. I.

† Gard. Chron. 1867, p. 264.

tion of a little dried cow-manure. When the pseudo-bulbs are potted singly, which is the usual practice, small pots should be preferred, from which the plants can be subsequently shifted into others of larger dimensions if necessary. The pots should be filled to one-half their depth with drainage consisting of clean broken crocks, upon which may be placed a layer of sphagnum, and the remainder filled with compost up to the rim. Water must be given sparingly at first until the new growths, in the axis of which the pseudo-bulbs are formed, begin to root freely. As soon as active growth has fairly commenced the plants must receive frequent and liberal waterings at the roots. At this stage, when the pots are well filled with roots, many cultivators supplement the usual waterings with a little weak manure water, applying it about once a week or less frequently according to the condition of the plants. As the new pseudo-bulbs approach maturity and the leaves begin to turn yellow, the waterings must be gradually reduced in frequency and quantity, till at length when the leaves have fallen and the flower scapes appear, they must reach the minimum or only just sufficient to prevent the latter from drooping. After flowering water must be withheld altogether and the pseudo-bulbs allowed to become dormant; they will be most effectively brought into this state by laying the pots on their sides in any dry place such as may be found under one of the stages of the house in which they are cultivated. Coming from one of the hottest regions of the globe, the Calanthes of this section require the temperature of the East Indian house, in which during active growth they should have a light and airy position; they may also be successfully cultivated in a pine stove or a cucumber house.

VERATRIFOLIE. The same compost may be used for the species and hybrids belonging to this group as for the deciduous kinds, giving drainage to about one-third of the depth of the pot. The re-potting should be performed in early spring, and as all the cultivated kinds are vigorous-growing plants that root freely they require ample pot room. They should receive copious waterings while growing, and even in the winter months they must at no time be allowed to get quite dry at the roots. Being evergreen with foliage of stouter texture than that of the **VESTITA** group, they can endure a greater amount of shade, and they may also be grown in a somewhat lower temperature such as is maintained in the intermediate house; for the Japanese species the temperature of an ordinary greenhouse is sufficient. The flowering season of most of the tropical species belonging to this group may be prolonged by removing the plants, as soon as the first flowers have expanded, into a lower temperature and drier atmosphere.

The Calanthes of this group are at all times liable to the attacks of brown scale and green fly (aphides); the former attach themselves to the leaves and may be checked by sponging with soapy water; the latter settle on the flowers and may be dislodged by fumigating.

Calanthe brevicornu.

Leaves oval-oblong or lanceolate, petiolate, acute, 9—12 inches long. Scapes as long as or longer than the leaves, erect, racemose above, many-flowered. Flowers 1—1½ inch in diameter with very short pedicel and ovary; sepals and petals spreading, brownish purple with a paler mid-nerve and margin, whitish at the base; the dorsal sepal elliptic-oblong, acute, the lateral two lanceolate, and at right angles to it; petals similar to the lateral sepals but smaller; lip sub-panduriform, emarginate, red-purple margined with white; disk with three raised lines of which the middle one is the longest, narrow and yellow on the basal side, much dilated and red in front; spur very short.

Calanthe brevicornu, Lindl. Gen. et Sp. Orch. p. 251 (1832). *Sert. Orch.* t. 9 (1838). *Fol. Orch. Cal.* No. 4.

First discovered in Nepal, in 1821—22, by Dr. Wallich, from whose drawing of a plant *in situ* Dr. Lindley's plate in the *Sertum Orchidaceum* was copied. Many years afterwards it was gathered by Sir J. D. Hooker in Sikkim, whence it was recently introduced to the Royal Gardens at Kew. The colour of the flowers is peculiar, and agrees nearly in this respect with the Japanese *Calanthe discolor* figured in the *Botanical Register* for 1840, t. 55.

C. curculigoides.

Leaves elliptic lanceolate, acute, 12—18 inches long. Scapes half as long as the leaves, sheathed below by adherent brownish bracts, densely racemose above. Flowers partially opening, ¾ inch across, pale orange-yellow with a red blotch on the lip; sepals and petals oblanceolate, acute; lip three-lobed, the lateral lobes rotund, erect, the intermediate lobe oblong, acute, reflexed; spur hooked.

Calanthe curculigoides, Lindl. Gen. et Sp. Orch. p. 251 (1832). *Bot. Reg.* 1847, t. 8. *Fol. Orch. Cal.* No. 10. *Bot. Mag.* t. 6104. *Fl. Mag.* n.s. t. 349.

First discovered by Griffith in the Malay peninsula, and shortly afterwards introduced from Malacca by Messrs. Loddiges, in whose nursery at Hackney it flowered in 1845. It has since been gathered at Penang, Singapore and other places. It appears to have been lost to cultivation for many years till its re-introduction in 1873—4 again brought it under the notice of horticulturists. Its dense raceme of scarcely half-expanded, orange-coloured flowers render it singular among the cultivated Calanthes. The specific name was suggested by the resemblance of its foliage to that of some species of Curculigo.

C. labrosa.

Pseudo-bulbs sub-conical, angulate, 2—3 inches long, with a transverse

depression about an inch below the apex. Scapes hairy, 12—15 inches high, loosely racemose, 7—10 flowered; bracts oblong, acute, half as long as the stalked ovaries. Flowers scarcely an inch in diameter; sepals and petals ligulate, acute, rose-purple, the petals broader than the sepals; lip with a wedge-shaped base that is convolute over the column, and a dilated, undulate blade that is light rose-purple dotted with dark purple, white at the base; spur filiform, hairy, shorter than the ovary. Column semi-terete, short, white at the base, light rose at the apex.

Calanthe labrosa, Rehb. in *Gard. Chron.* XIX. (1883), p. 44. *Limatodes labrosa*, Rehb. in *Gard. Chron.* XI. (1879), p. 202.

Sent to us in 1878 by a correspondent in southern Burmah, who gave no locality; it has now almost disappeared from cultivation. It is noticed in this place chiefly on account of its participation in the parentage of one of the most distinct race of hybrid Calanthes yet raised—*Calanthe porphyrea*, *C. lentiginosa* and varieties.

C. Masuca.

Leaves oblong-lanceolate, or oval-oblong, acuminate, 9—15 inches long, narrowed below into a fluted petiole. Scapes 1½—3 feet high, with a closely-appressed bract at each joint, and terminating in a crowded raceme of purplish mauve flowers, on slightly twisted pale mauve pedicels sheathed by a subulate-lanceolate bract; sepals and petals similar, ovate-oblong, acuminate; lip deeper in colour than the other segments, three-lobed, the basal lobes oblong, sub-falcate, the intermediate lobe transversely roundish oblong, emarginate; spur slender, as long as the ovary, furrowed on one side, bifid at the tip; crest reddish brown, three-lobed. Column very short.

Calanthe Masuca, Lindl. Gen. et Sp. Orch. p. 249 (1832). Fol. Orch. Cal. No. 17 (1854). *Bot. Reg.* 1844, t. 37. *Bot. Mag.* t. 4541. *C. emarginata*, Wight, Ic. pl. Ind. or. t. 918. *Bletia Masuca*, Don. Prod. Fl. nep. 30.

Native of the lower Himalayan ranges of Nepal and Sikkim, also of the Neilgherries in the extreme south of India and in the Ambagamowa district in Ceylon, at 2,000—2,500 feet elevation. It was introduced by Messrs. Rollisson, in whose nursery at Tooting it flowered for the first time in this country in 1842.

C. natalensis.

"Leaves elliptic-lanceolate acuminate, 8—12 inches long and 3—5 inches broad, narrowed into a concave petiole. Scapes longer than the leaves, terminating in a pyramidal raceme, 6—8 inches long. Flowers 1—1½ inches in diameter, pale lilac with a darker, redder lip, or with the sepals and petals white suffused with lilac towards the margin only; sepals ovate-lanceolate, acuminate; petals rather shorter and broader; lip three-lobed, the lateral lobes small, oblong, obtuse and curved; mid-

lobe broadly obovate; disk with a cluster of prominent tubercles at the base and a few smaller ones along the medium line towards the notch at the end; spur slender, incurved, as long as the ovary. Column very short."—*Botanical Magazine*.

Calanthe natalensis, Rchb. in Bonpl. 1856, p. 322. N. E. Brown in Gard. Chron. XXIV. (1855), pp. 78, 136. *Bot. Mag.* t. 6844. *C. sylvatica natalensis*, Rchb. in Linnaea, XIX. p. 374. *C. sylvatica*, Hemsley in Gard. Chron. XIX. (1883), p. 636.

A handsome species with the habit of the well-known *Calanthe veratrifolia*, recently introduced to the Royal Gardens at Kew from King William's Town, in South Africa, near which it grows in "marshy places in woods and forests"; it was, however, known to science many years previously. By some botanists *C. natalensis* is regarded as a geographical form only of a species widely distributed over a broad region of the eastern hemisphere, stretching in an oblique direction from Cape Colony to Japan, and of which *C. sylvatica*, a native of Mauritius and Bourbon, is the type. We prefer, however, following Sir J. D. Hooker and Mr. N. E. Brown in accepting it as a distinct species, especially as the typical *C. sylvatica* is not believed to be in cultivation at the present time. *C. natalensis* is the only known Calanthe inhabiting South Africa.

C. pleiochroma.

Leaves oblong-lanceolate, acuminate, plaited, 12—18 inches long. Scapes erect, 18—24 inches high, with a pale sheathing bract at each joint, and terminating in a loose, many-flowered, pyramidal raceme. Flowers 1½ inches in diameter, pale mauve suffused with white; sepals and petals elliptic-oblong, acuminate; lip shorter than the other segments, three-lobed, the side lobes oblong, the intermediate lobe broadly obovate, emarginate with a violet spot in front of the orange-red calli.

Calanthe pleiochroma, Rchb. in Gard. Chron. 1871, p. 938.

Introduced by us from Japan, and flowered for the first time in our Chelsea nursery in May, 1871. Its nearest affinities are *Calanthe versicolor* and *C. natalensis*, and like them it may hereafter be reduced to varietal rank as a geographical form of *C. sylvatica*.

C. rosea.

Pseudo-bulbs sub-conical, elongated, angulate, 4—5 inches long, with a transverse depression or neck about mid-way between the base and apex, and sheathed at the base by large acuminate scales. Leaves broadly lanceolate, prominently nerved. Scapes about a foot high, pubescent, 7—12 or more flowered. Flowers about 2 inches across vertically, light rose suffused with white, and with a deeper stain on the inner side of the convolute lobes of the lip; sepals and petals lanceolate, acute, with a depressed

median line; lip convolute at the base into a short tube; blade oblong, retuse at apex; spur whitish, shorter than the stalked ovary, at the base of which is a lanceolate acuminate bract.

Calanthe rosea, Benth. in Jour. Linn. Soc. XVIII. p. 309 (1881). *Limatodes rosea*, Lindl. in Paxt. Fl. Gard. III. t. 81 (1852). Fol. Orch. Limatodis, No. 2 (1854). Bot. Mag. t. 5312. Van Houtte's Fl. des Serres, XXII. t. 2294.

First detected by Thomas Lobb in Moulmein about the year 1850, and sent by him to our Exeter nursery, where it flowered for the first time in the following winter; it was rediscovered about ten years afterwards in the same province by the Rev. C. Parish, who sent plants to Messrs. Low and Co. It is better known in gardens under its original name of *Limatodes rosea* than that under which it is described above, and although a beautiful orchid, it is not now often seen on account of its being surpassed in the beauty of its flowering by *Calanthe Veitchii* × and other hybrids, in whose parentage it has participated, and which also have a more robust constitution. The propriety of reducing it to Calanthe is thus shown by Mr. Bentham:—“The facility with which *Limatodes rosea* can be made to hybridise with *Calanthe vestita* has been given as an instance of ready hybridisation between two distinct genera; but the fact appears to be that *Limatodes rosea* itself has all the characters of Calanthe, and is indeed a species very nearly allied in every respect to *Calanthe vestita*.^{*}”*

C. striata.

Stems formed of the sheaths enveloping the bases of the leaves, 2–6 inches high. Leaves elliptic-lanceolate, acute, 6–10 inches long, narrowed below into a long grooved petiole. Scapes stoutish, erect, 15–20 inches high, loosely racemose above, 10–15 flowered. Flowers 1½–2 inches in diameter; sepals and petals brownish red, striated, bordered and tipped with yellow, pale yellow at the very base, the dorsal sepal oval-oblong, the lateral two oblong-lanceolate; the petals narrow, linear-spathulate; lip three-lobed, bright yellow, the side lobes dolabriform or semi-ovate, the intermediate lobe obovate, emarginate, with three raised plates that are reduced to shallow keels in the middle, the outside two again enlarged in front of the cavity formed by the union of the lip with the column; spur incurved, half as long as the ovary. Column terete, short, pale yellow.

Calanthe striata, R. Br. in Bot. Reg. 1821, sub. t. 573. Lindl. Gen. et Sp. Orch. p. 251 (1832). Fol. Orch. Cal. No. 29. Franch. et Sav. Enum. Pl. Jap. II. p. 24. Bot. Mag. t. 7026. C. bicolor, Lindl. Sert. Orch. sub. t. 9. (1838). C. Sieboldii, Regel's Gartenfl. 1869, t. 635. *Limodorum striatum*, Banks, Ic. Kämpf. t. 3.

* Jour. of Linn. Soc. XVIII. p. 309.

This plant has been known to science since the beginning of the seventeenth century, through a drawing by Kœmpfer, the first European naturalist who visited Japan, which he did in the capacity of physician to the Dutch embassy to that country in 1690. It does not appear to have been in cultivation in European gardens till the middle of the present century, when it was sent to Dr. Lindley by a nurseryman of Ghent. Since then "it has been found by all collectors in the woods near the town of Nagasaki, and by some at Kanagawa." It is said to be a very variable species, the variation occurring in the lobing of the labellum, and in the colour of the flowers. We are indebted to the Royal Gardens at Kew for materials for description.

C. Textorii.

Leaves oblong-lanceolate, acute, plaited and petiolate as in *Calanthe veratrifolia*. Scapes robust, 24 or more inches high, pubescent with an acute sheathing bract at each joint and at the base of each pedicel. Flowers $1\frac{1}{2}$ inches across vertically, on white pedicels arranged in a corymbose raceme; sepals oval, apiculate with three longitudinal nerves, white; petals smaller, obovate with one nerve, white stained with pale mauve-purple, afterwards wholly white; lip four-lobed, the basal lobes linear-oblong, oblique, white, the apical lobes larger, oblong, stained with mauve-purple that becomes paler with age. Callus tubercled, at first brick-red, afterwards ochre-yellow.

Calanthe Textorii, Miquel. Prod. p. 156, ex. Franch. et Sav. Enum. Pl. Jap. II. p. 26.

Introduced by us in 1877 from Japan through Mr. Charles Maries. There is so little to distinguish it from the widely distributed *Calanthe veratrifolia*, that it may hereafter be reduced to a variety of that species.

C. tricarinata.

Leaves broadly oval or oval-oblong, plicate, 5—6 inches long. Scapes erect, pubescent, as long as the leaves, loosely racemose along the distal half, few flowered. Flowers an inch in diameter; sepals oval-oblong, acute, whitish tinted with pale green and with some rose-pink stains; petals narrower, spatulate, acute, the basal half whitish, the apical dilated half stained with rose-pink; lip three-lobed, the side lobes large, spreading, hatchet-shaped with the outer margin toothed, rose-purple bordered with white; the front lobe much smaller, oblong with a deep notch in the anterior margin and three white keels on the disk, rose-

purple bordered with white: spur obsolete. Column white stained with rose.

Calanthe tricarinata, Lindl. Gen. et Sp. Orch. p. 252 (1832). Fol. Orch. Cal. No. 1 (1854). Franch. et Sav. Enum. Pl. Jap. II. p. 26.

First discovered by Wallich in Nepal, in the early part of the present century, and many years afterwards by the Russian botanist, Maximowicz, in Japan,* from which country it was introduced by us in 1879, along with *Calanthe Textorii*. It is by no means an inattractive species, easily distinguished from every other cultivated *Calanthe* by the absence of the spur of the labellum.

C. veratrifolia.

A robust plant with spreading ovate or oblong-lanceolate strongly ribbed leaves, 18—24 inches long, that spring from a stoutish slowly creeping rhizome. Scapes erect with an acuminate bract at each joint and a smaller one at the base of each pedicel, and terminating above in a dense corymbose raceme of white flowers. Flowers 2 inches in diameter; sepals obovate-oblong with a small green apiculus; petals obovate-spathulate, apiculate; lip quadripartite, the basal lobes oblong, spreading, the anterior lobes usually broader, but sometimes equal to them, divergent; callus tubercled, yellow; spur slender, straight, half as long as the ovary.

Calanthe veratrifolia, R. Br. in Bot. Reg. 1821, sub. t. 573. *Id.* t. 720 (1823). Lindl. Fol. Orch. Cal. No. 25. Griffith, Ic. pl. Asiatic. t. 283. *Bot. Mag.* t. 2615 Benth. Fl. Austr. VI. p. 305. Fitzgerald, *Austr. Orch.* I. part 4. C. comosa, Rehb. in Linnæa, XIX. p. 374, ex. Hemsley in Gard. Chron. XIX. (1883), p. 636. C. Petri, Rehb. in Gard. Chron. XIV. (1880), p. 326. C. colorans, Rehb. in Gard. Chron. XXIV. (1885), p. 360. Williams' *Orch. Alb.* V. t. 218. C. australis, Hort.

var.—*macroloba*.†

Flowers larger, with the basal lobes of the lip broader than in the common form.

C. veratrifolia *macroloba*, Rehb. in Gard. Chron. IX. (1878), p. 690.

var.—*Regnieri*.†

Flowers snow-white with a pale yellow lip, the basal lobes of which are nearly semi-lunate, and the calli simpler.

C. veratrifolia *Regnieri*, Rehb. in Gard. Chron. II. s. 3 (1887), p. 70.

Calanthe veratrifolia is the species upon which the genus was founded, and the first *Calanthe* that was introduced into British gardens. The earliest mention of it as a horticultural plant occurs in the *Botanical Register* for 1823, in which year it flowered in Mr. Colville's nursery at Chelsea, whither it is believed to have been sent by Allan Cunningham, from Sydney, along with *Dendrobium speciosum* and other Australian orchids. It is spread over an immense region in the far East,

* In grassy woods near Lake Conoma in the Island of Jesso.

† Not seen by us.

of which the limits are not very easily defined, but which extends from New South Wales to Japan in one direction, and from the Feejee Islands to Southern India in the other. Among the stations



Calanthe veratrifolia.

within this region in which it has been detected, Illawarra (N. S. Wales),* Rockingham Bay and Moreton Bay in Queensland, Amboyna, Java, Cochin China, Ceylon, and the Neilgherry Hills have

* In New South Wales it is usually found near the banks of streams growing in decayed vegetable matter of so loose a texture that the plants may be pulled from the soil without digging. —Gard. Chron. XX. (1883), p. 722.

been especially mentioned. Over so vast a range it is found to be remarkably constant, but some geographical forms have been recognised that deviate from the Australian type, although in very trivial characters that may be disregarded without inconvenience; the two varieties described above are the most recent that have been brought under notice. The specific name *veratrifolium* was given to this orchid from the resemblance of its foliage to that of *Veratrum nigrum*, a Liliaceous hardy plant, native of central Europe, and frequently seen in the herbaceous borders of old English gardens.

C. *vestita*.

Pseudo-bulbs sub-conical, bluntly angulate, $3\frac{1}{2}$ —5 inches long, pale greenish grey striated. Leaves appearing after the flowers, broadly lanceolate, acuminate, 18—24 or more inches long, narrowed below into a channelled and winged petiole and prominently ribbed beneath. Scapes sub-erect or nodding, 24—36 inches long, very hairy, racemose from near the base, many flowered; bracts large and conspicuous, ovate lanceolate acuminate, nearly as long as the stalked ovaries. Flowers 2—3 inches across vertically, milk-white with a yellow striated blotch on the lip immediately in front of the column; sepals and petals spreading, the former oval-oblong, apiculate, the latter obovate-oblong, obtuse; lip flat, three-lobed, the side lobes obliquely oblong, obtuse, the front lobe broadly obovate with a deep cleft in the apical margin; spur slender, decurved, greenish.

Calanthe vestita, Wall. Lindl. Gen. et Sp. Orch. p. 250 (1832). Fol. Orch. Cal. No. 35. Bot. Mag. t. 4671. Van Houtte's *Fl. des Serres*, VIII. t. 816 (copied from Bot. Mag.) Warner's *Sel. Orch.* I. t. 29. Cytheris Griffithii, Wight, ic. pl. Ind. or. t. 1751. Preptanthe vestita, Rehb. in Bot. Zeit., 1853, p. 493.

sub-vars. — *gigantea* (Williams' *Orch. Alb.* V. t. 211. *Revue de l'hort Belge*, 1889, p. 121, grandiflora), plant and flowers larger in all their parts, the spot on the lip orange-red; *rubro-oculata* (Paxt. *Mag. Bot.* XVI. p. 129. Regel's *Gartenfl.* 1873, t. 751.), the blotch on the disk of the lip red-purple.

var.—*Regnieri*.

Pseudo-bulbs more elongated and with a transverse depression or neck a little above the middle. Scapes erect, the flowers smaller than in the type, with the lip less deeply lobed, which is rose colour, with a crimson-purple blotch at the base that is also spread over the claw and part of the column.

C. vestita Regnieri, supra. C. Regnieri, Rehb. in Gard. Chron. XIX. (1883) p. 274. *The Garden*, XXIV. (1883), t. 397.

sub-vars. — *Sander's*, rosy carmine, deeper in colour than *Calanthe Veitchii*; *Stevens'*, white with a small rose-coloured blotch on the disk of the lip; *Williams'* (*Orch. Alb.* III. t. 134), the petals

and lateral sepals pencilled with rose-carmine; the lip deep carmine with a crimson-purple blotch on the disk that is spread over the column.

var.—Turneri.

Pseudo-bulbs as in the variety *Regnierii* but somewhat smaller; scapes erect, the flowers like those of the sub-variety *rubro-oculata*, but appearing later in the season.

C. *vestita* Turneri, supra. C. Turneri, Hort.

sub-var.—ninalis, flowers wholly white.

To that indefatigable and zealous Indian botanist Dr. Wallich, whose name appears so frequently in these pages, science is also indebted for the first discovery of this beautiful Calanthe, it having



Calanthe *vestita* rubro-oculata.

been detected by him at Tavoy in Tenasserim soon after the annexation of the province in 1826. Later it was gathered by Griffith at Mergui in the same province, but it was not till 1848 that it was introduced into European gardens, when Dr. Kane, of Exmouth, sent from Moulmein to our Exeter firm two of the forms described above, viz., that with the yellow spot on the lip, usually regarded as the type, and its sub-variety with the red-purple spot. Shortly afterwards these two forms and the variety *Turneri*, named in compliment to the late Mr. J. A. Turner, of Pendlebury, near Manchester, one of the most ardent orchid amateurs of that time, were sent to Exeter from the same locality by Thomas Lobb.

The variety *Regnieri* is a comparatively recent introduction from Cochin-China by M. Regnier, of Paris, whose first plants were offered for sale at Stevens' Rooms in the spring of 1883; it is found to be the most variable of all the *vestita* forms as regards the colour of the flowers. The specific name, *vestita*, "clothed," was suggested by the long shaggy hairs that clothe the flowering stems. The flowering season of *Calanthe vestita* and its varieties extends from the beginning of December to the end of February in the following order: first the type and its sub-varieties, then *Turneri*, and lastly *Regnieri*, but with the last two the order is sometimes inverted, and sometimes their flowering is contemporaneous.

HYBRID CALANTHES.

The crossing of Calanthes was among the earliest experiments in the hybridisation of orchids made by Dominy, who succeeded, in 1856, in flowering *Calanthe Domini*, which he had raised from *C. Masuca* × *C. furcata*, a species that has long since disappeared from cultivation. This was followed by *C. Veitchii*, raised by him from *C. rosea* × *C. vestita*, which flowered for the first time in 1859. It is a curious fact that notwithstanding the high estimation in which *C. Veitchii* has always been held by horticulturists as a winter-flowering orchid, a period of twenty years elapsed before another hybrid was added to the group to which it belongs, the next acquisition being *C. Sedenii*, raised by the indefatigable hybridist after whom it is named. By this time, however, muling among Calanthes of the VESTITA section was being undertaken by many amateur cultivators, notably by Sir Trevor Lawrence, Bart., Mr. Norman Cookson, Mr. Charles Winn and others, so that since the first flowering of *C. Sedenii* in 1878, hybrids and crosses have appeared in almost embarrassing profusion. Nor has the beauty of the seedlings and the interest attending the raising of them alone contributed to bring about these results; the comparatively short period in which the seedlings can be brought into flower, has afforded a stimulus to the same end. The capsule of *Calanthe* usually ripens in three to four months, and the seed takes from two to three months more to germinate; the seedlings, under favourable circumstances, will flower in the third or fourth year, one of the shortest periods known in the experience of orchid hybridisation.

As a natural consequence of the raising of numerous hybrids by different operators from so limited a number of species as are available in the VESTITE section, progenies from crossing two of these species, or one of them with one of the varieties of *Calanthe vestita* have been obtained by more than one operator, each of whom has named his own productions independently of the others, and hence the same, or nearly the same form is cultivated under different names. Till all the forms so named can be brought together and compared, and their differences or identity can be shown, we adhere to the course mainly followed in this work, of recognising one name only for seedlings raised from the same cross, adopting the name first published in the horticultural press. Slight differences in colour may always be expected, even among the same progeny, and especially when one of the parents is itself a hybrid; in such cases distinctive vernacular names are often applied for garden use at the pleasure of the raiser, but such names can, of course, have no place in scientific nomenclature.

VESTITE HYBRIDS.

Calanthe Aurora.

C. vestita Regnieri × *C. rosea*.

Flowers nearly as in *C. vestita Regnieri*, bright rose, the sepals and petals paler towards their base, the tube of the lip dark carmine.

Calanthe Aurora, supra.

Raised by Mr. Charles Winn, of Selly Hill, Birmingham.

C. Barberiana.

C. vestita Turneri nivalis × *C. vestita*.

Pseudo-bulbs intermediate between those of the two parents, slightly constricted at about one-third of their length from the apex. Flower pure white with a small yellow stain on the lip.

Calanthe Barberiana, Rchb. in Gard. Chron. XV. (1881), p. 136.

Raised by Mr. J. T. Barber, of Spondon, Derby. Very near this is *Calanthe cesta* ×, of the Burford Lodge collection.

C. bella.

C. vestita Turneri × *C. Veitchii*.

Flowers as large as the best *Veitchii* forms; sepals and petals delicate light rose suffused with white, the rose colour more developed in some places than in others; lip similarly coloured and with a rose-carmine spot at the base.

Calanthe bella, Rchb. in Gard. Chron. XV. (1881), p. 234.

Raised by Seden at our nursery.

C. Hallii.*C. vestita* × *C. Veitchii*.

Flowers white with the exception of the tips of the lateral sepals which are pale green and a light cream-yellow stain on the disk of the lip. The two front lobes of the lip are small and distinct from those in either parent.

Calanthe Hallii, Hort. Hall.

Cultivated in the collection of the late Mr. Hall, of Upper Tulse Hill, Camberwell.

C. lentiginosa.*C. labrosa* × *C. Veitchii*.

Flowers intermediate in size between those of the two parents; in form nearly like *Calanthe labrosa*, especially the lip, the claw of which is adnate to the column, forming with it a wide-mouthed funnel, the



Calanthe lentiginosa carminata.

blade obscurely four-lobed with crisped margin, convolute over the column at the base; in colour white with a faint flush of pale rose at the base of all the segments, the base of the lip spotted with bright rose.

Calanthe lentiginosa, Rehb. in Gard. Chron. XIX. (1883), p. 44.

sub.-vars.—*rosea*, light rose with deeper spots on the lip; *carminata*, rose-carmine, the side lobes of the lip toned with scarlet.

Raised by Seden at our nursery. The sub-variety *carminata* is the richest coloured hybrid Calanthe yet obtained.

C. porphyrea.*C. labrosa* × *C. vestita rubro-oculata*.

Flowers more nearly in form like those of the seed than of the pollen parent, with the lip more open, sub-orbicular, three-lobed; spur

broad, whitish; sepals and petals carmine-purple, the lip paler, white at the base, spotted with carmine-purple.

Calanthe porphyrea, Rchb. in *Gard. Chron.* XXI. (1884), p. 76.

Raised in the collection of Sir Trevor Lawrence, Bart. at Burford Lodge. It is one of the handsomest of hybrid Calanthes, easily distinguished from the preceding by its differently formed and differently coloured labellum.

C. Sandhurstiana

C. rosea × *C. vestita rubro-oculata*.

Flowers as in *Calanthe Veitchii* as regards form; deep rose-carmine, the sepals somewhat paler than the petals and the lip with a deeper spot at the base.

Calanthe Sandhurstiana, Goss. and Rchb. in *Gard. Chron.* XV. (1881), p. 391. *C. burfordensis*, Hort. Lawr. and probably *C. sanguinaria*, Rchb. in *Gard. Chron.* XXV. (1886), p. 331.

Raised by the late Mr. P. H. Goss, of Sandhurst, Torquay. One of the best coloured of the *Calanthe Veitchii* group of hybrids. It differs but little from the following except in colour, but being derived from a different parentage we keep it distinct. A variety with paler flowers is in cultivation at Burford Lodge under the name of *C. amabilis*.

C. Sedenii.

C. Veitchii × *C. vestita rubro-oculata*.

Flowers nearly as in *Calanthe Veitchii*, but of a deeper colour, clear rose-carmine with a deeper blotch surrounded with white at the base of the lip.

Calanthe Sedenii, Rchb. in *Gard. Chron.* IX. (1878), p. 168. *C. Alexandri*, Hort. Cookson.

Raised by Seden at our nursery, where it flowered for the first time in 1878, and subsequently obtained from the same cross by Mr. Norman C. Cookson, of Wylam-on-Tyne. One of the best of the rose-coloured Calanthes.

C. Veitchii.

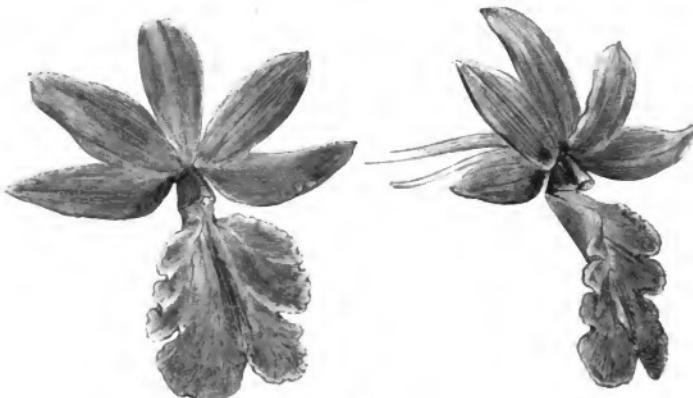
C. rosea × *C. vestita*.

Pseudo-bulbs 7—9 inches long, elongated as in *Calanthe rosea*, but much more robust, with a depression or neck at about one-third of their length from the base. Flowers nearer those of *C. rosea* but with a four-lobed lip as in *C. vestita* less deeply cleft, bright rose with a white spot at the base of the lip, the basal lobes of which are rolled inwards towards the column, and not adnate to it.

Calanthe Veitchii, Lindl. in *Gard. Chron.* 1859, p. 1016. *Bot. Mag.* t. 5375. Regel's *Gartenfl.* 1873, t. 751. *Fl. Mag.* t. 280. Jennings' *Orch.* t. 48. Williams' *Orch. Alb.* I. t. 31.

sub-vars.—*alba*, flowers wholly white; *versicolor*, flowers variable, some rose, some white, others with one or more of the segments rose, and the remainder white.

Raised by Dominy at our Exeter nursery in 1856, the first hybrid of the *VESTITA* section obtained, and one of the most useful and popular of winter-flowering Calanthes; it is the type of a group of hybrids in all of which *Calanthe rosea* has participated in the parentage, either directly or meditately through *C. Veitchii*. The white form was also originally raised by Dominy, unknown to himself at



Calanthe Veitchii.

the time, at our Exeter nursery, whence it was sold to Mr. Wentworth Buller, of Strete Raleigh, Devonshire, for the typical form; at the dispersion of Mr. Buller's collection, it passed into the hands of the late Mr. John Day. The white form has since been raised by Mr. J. T. Barber, Mr. Norman C. Cookson (*C. Cooksonii*), and by Sir Charles Strickland, Bart.*

VERATRIPOLIA HYBRIDS.

Calanthe Dominii.

C. Masuca × *C. furcata*.

A robust plant with the habit of *Calanthe Masuca*. Flower stems nearly as in *C. Masuca*, and terminating in a large corymbose, many-flowered raceme. Flowers 2 inches in diameter, intermediate between those of the two parents, light mauve-purple suffused with white, the lip deeper in colour than the other segments and with a yellow three-toothed callus at its base.

Calanthe Dominii, Lindl. in *Gard. Chron.* 1858, p. 4. *Bot. Mag.* t. 5042.

* *Gard. Chron.* VII. s. 3 (1890), p. 132.

This Calanthe, the only hybrid in the *VERATRIFOLIE* section known to us, will always be regarded with interest as being the first hybrid orchid that flowered, although not the first seedling raised by hand. It flowered for the first time at Exeter, in October, 1856, and was in due course submitted to Dr. Lindley for examination and naming. He accordingly named it after our then foreman, Mr. Dominy, "in order to put upon permanent record the name of the first man who succeeded in the operation of hybridising orchids."*

ARUNDINA.

Blume, *Bijdr.* p. 401 (1825). Benth. et Hook. *Gen. Plant.* III. p. 521 (1883).

Arundina includes about six species that are spread over eastern Asia from southern China to the Malay Archipelago, and also over parts of India and Ceylon. It is most nearly allied to *Calanthe*, from which the spurless labellum that enfolds the column at its base, and the reed-like leafy stems chiefly distinguish it. The most obvious characters of the genus will be readily understood from the description of *A. bambusæfolia* given below, which has large handsome flowers, and is occasionally met with in orchid collections. Another showy species, *A. densa*, sent from Singapore by Cuming, to Messrs. Loddiges, in whose nursery at Hackney it flowered in 1842, seems to have been long since lost to cultivation; and a third, *A. speciosa*, the species upon which the genus was founded, said to be very handsome, has not yet been introduced; the other species known to science have smaller and less showy flowers.

The generic name *Arundina*, "reed-like," refers to the slender reed-like stems, common to all the known species.

Arundina bambusæfolia.

A terrestrial plant. Stems terete, erect, as thick as an ordinary writing pencil, 2—4 feet high, pale green and leafy above. Leaves linear-lanceolate, acuminate, 9—12 inches long, gradually smaller upwards, the upper ones reduced to sheathing bracts. Peduncles terminal, short and few flowered. Flowers 2—2½ inches across; sepals and petals rosy lilac, the former narrowly lanceolate, the latter ovate-oblong, acute; lip broadly oval-oblong, obscurely three-lobed, the side lobes coloured like the sepals and petals, convolute over the column, recurved in front where they are of a deeper colour; the intermediate lobe open, bipartite, deep purple; disk white, fleshy, with two undulated lamellæ that are prolonged to

* *Gard. Chron.* 1858, p. 4.

the base of the lip, and a third shallower and shorter one between them. Column slender, clavate, narrowly winged on each side of the stigmatic cavity, pale purple. Anther two-celled; pollinia eight, four in each cell, disk-like, compressed, pale yellow.

Arundina bambusefolia, Lindl. Gen. et Sp. Orch. p. 125 (1831). Bot. Reg. 1841, misc. No. 5. Wight, Ic. pl. Ind. or. V. t. 1861. Williams' *Orch. Alb.* III. t. 189.

This pretty orchid first became known in the early part of the present century through Dr. Roxburgh, Superintendent of the Botanic Garden at Calcutta; it was subsequently noted by Wallich, Griffith and other Indian botanists. It is a native of N. E. Bengal, Assam, and north Burmah, and was first introduced into British gardens by Messrs. Loddiges, in whose nursery it flowered for the first time in 1841.

Cultural Note.—A compost of fibrous peat and loam, such as is used for terrestrial orchids with slender stems, the Sobralias for example, is the most suitable. The drainage of the pots should be ample, and water freely supplied during the growing season. A light position in the East India house should be given to the species described above.

SUB-TRIBE LÆLIEÆ.

*Inflorescence nearly always terminal. Pollinia in one or two series of 4 each, those of each series lying side by side, ovate, laterally compressed, and connected by a pollinaceous appendage in the form of two linear laminae often uniting into one, and ascending from the base of the lower or single series along their outer edge; the upper series, when present, descending from the upper end of the lamina, and often smaller than the lower series.**

DIACRIUM.

Benth. in Jour. Linn. Soc. XVIII. p. 312 (1881). Benth. et Hook. Gen. Plant. III. p. 526 (1883).

The three or four species, or marked varieties of one species, now referred to Diacrium, were made sectional by Lindley under Epidendrum, but "the peculiar bi-cornute labellum which is neither adnate

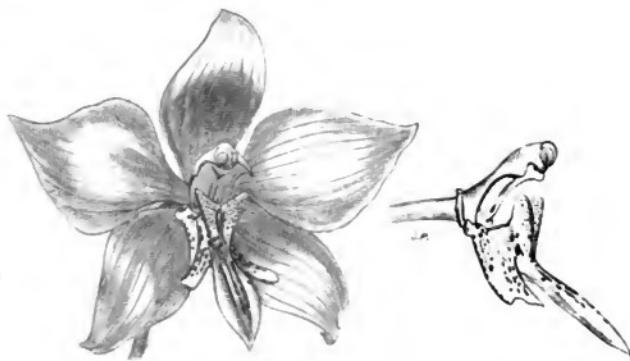
* Bentham in Jour. Linn. Soc. XVIII. p. 311.

to, nor parallel with the column, gives the flower a very different aspect from that of the true species of *Epidendrum*, and cannot be included in them without doing violence to the generic character."* They are natives of the West India Islands and Central America, of which one only, the typical species described below, is generally cultivated in the orchid collections of Great Britain. A second form, under the name of *Epidendrum bigibbosum*, was cultivated many years ago by Consul Schiller, of Hamburg, and has within the last few years been introduced into British collections from the valley of the Magdalena, where it occurs in the damp jungle that lines the river-side; it is simply a miniature form of the type as regards its flowers.

The name *Diacrium* is obscure; it is probably derived from διάκρισις (diakrisis), "a separation," presumably referring to the separation of the lip from the column.

Diacrium bicornutum.

Stems fusiform or sub-cylindric, 6—9 or more inches high, sheathed by the scarious bases of the fallen leaves. Leaves usually three or four from the summit of the stems, oblong-lanceolate, 6—9 inches long,



Diacrium bicornutum.

acute or emarginate, very leathery. Peduncles terminal, a foot long, sheathed at each joint by a membranous, acute bract, and bearing at its extremity a short raceme of 3—5 or more fragrant flowers.† Flowers 2—2½ inches in diameter; sepals and petals spreading and slightly con-

* Bentham in Jour. Linn. Soc. XVIII. p. 312. A glance at the figure of the column and lip given in the text will at once confirm the justice of this remark.

† In exceptionally rare instances, 12—20 flowers. Gard. Chron. III. s. 3 (1888), p. 746.

cave, pure white, the sepals oval-oblong, the petals broadly oval, acute; lip smaller than the other segments, sessile and at a right angle to the column, white, dotted with purple, three-lobed, the side lobes oblong, oblique, the middle lobe lanceolate, acute; crest fleshy, two-lobed, the lobes horn-like, erect, yellowish. Column broad, semi-terete above, winged, white with some purple spots and markings at the base on the inner side.

Diacrium bicornutum, Benth. in Jour. Linn. Soc. XVIII. p. 312 (1881). Rolfe in Gard. Chron. II. s. 3 (1887), p. 44, icon. xyl. *Epidendrum bicornutum*, Hook. Bot. Mag. t. 3332 (1834). Paxt. Mag. Bot. V. p. 245 (1838). Schomb. Fl. Brit. Guiana, III. p. 907. Lindl. Fol. Orch. Ep. No. 82. Jennings' Orch. t. 21. Williams' Orch. Abb. IV. t. 157.

First introduced by Messrs. Shepherd, of Liverpool, in 1833, from Trinidad, where it is found growing on rocks or small islets so close to the sea that they must often be bathed by salt spray; it flowered for the first time in this country in the collection of Earl Fitzwilliam, at Wentworth, near Rotherham, in April of the following year, which is its normal season of flowering in the glass houses of Europe. Some years later it was detected by Sir Robert Schomburgk in Demerara, where it grows on the trunks of trees on the banks of the river; the flowers of the Demerara plant are said to differ from the Trinidad type, in having the petals spotted with purple like the lip. It has also been gathered in Tobago and other West India islands.

Cultural Note.—This orchid has frequently proved disappointing, a circumstance partly due, we have no doubt, to the difficulty of importing it in sound condition. Its hollow stems are inhabited by small ants, which find ingress through a cleft at the base that invariably occurs in the new growths under cultivation, and probably also in a wild state; they are prone to decay from within, and frequently crack during transmission, and in however small a degree they may be so affected, the plants never get well established in the glass houses of this country, and die in the course of two or three years after importation. With thoroughly sound plants the case is more hopeful; teak baskets are usually preferred, and as they require but a very small quantity of compost, a good drainage can always be secured. The compost should consist of the usual proportions of sphagnum and fibrous peat, with which many cultivators mix some pieces of charcoal. The habitat of the species indicates a high temperature and moist atmosphere, and these conditions are therefore necessary, especially while the plant is growing.

EPIDENDRUM.

Linn. Gen. p. 272. No. 689 (1737). Id. ed. VI. p. 464, No. 1016 (1764). Lindl. Fol. Orch. (1853). Benth. et Hook. Gen. Plant. III. p. 529 (1883).

The "father of modern botany," Linnaeus, referred all the tropical epiphytal orchids which he knew and which were about thirty in all, to *Epidendrum*; but these consisted of species that had been brought from India and Africa as well as from South America and Mexico, and therefore included forms that differed widely from each other. This simple classification soon failed to meet the requirements of science, so that even before the eighteenth century closed, his countryman, Oloff Swartz, began to lay the foundation of a more scientific classification of the tropical Orchideæ by separating from *Epidendrum cochleatum*, *E. ciliare* and *E. nocturnum*, which he retained under *Epidendrum*, the most divergent of the other Linnæan species, and founding new genera upon them; and as additions were constantly being made to the Orchideæ by the discovery of new species, the process was continued by succeeding botanists, notably by our own distinguished countrymen Dr. Robert Brown and Dr. John Lindley, especially the last named, during whose life-long labours a large number of new genera were established, and most of the older ones became tolerably well circumscribed, including the Linnæan *Epidendrum*, but which even in Lindley's time had become the most extensive genus in the Order. As elaborated in the *Folia Orchidacea* published in 1853, *Epidendrum* then included over three hundred species, but since that time numerous additions have been made, so that upwards of four hundred species good and bad are now known to science. A genus so extensive and varied must necessarily present much that is perplexing both to the scientist and to the horticulturist; hence to meet the exigences of a progressive science like botany it is not surprising that an occasional revision should be called for, whence it happens that species previously included have to be removed, and others formerly regarded as generically distinct have to be added. Some such changes have been found necessary in the case of *Epidendrum*,* and have therefore resulted in corresponding changes in nomenclature. As instances of separation we may cite *E. bicornutum* (Hook.) and its near ally and perhaps variety *E. bigibbosum* (Rchb.) The first named

* This genus has been twice revised since the publication of Lindley's *Folia Orchidacea* in 1853, first by Reichenbach, in Walper's *Annales Botanices*, 1861—5, and secondly by Bentham, in the *Genera Plantarum*, 1883. We have followed the last-named revision.

and two other allied forms were made sectional by Lindley, but are now raised to generic rank by Bentham under the name of Diacrium, the best known or type being that described in page 79. Instances of addition occur in the Barkerias, but they are made sectional. Reichenbach has indeed merged all the Cattleyas into Epidendrum, but in this he stands alone.*

Nearly one-half of the known species of Epidendrum have been introduced into gardens in the course of the past hundred years, but scarcely one-third of these or one-sixth of the whole are considered to be of any horticultural merit; the remainder consists chiefly of species with inconspicuous flowers, often of dingy colours and sometimes of such robust growth that they may be looked upon as being among the coarsest weeds of the orchid world; it should be noted, however, that the flowers of many of them are delightfully fragrant. The following diagnosis, abridged from the *Genera Plantarum*, includes all the most important floral characteristics of Epidendrum.

The *inflorescence* is terminal with few exceptions.

The *sepals* are free, equal and spreading, but sometimes reflexed.

The *petals* are similar and sub-equal, often a little narrower than the sepals.

The *lip* has an erect claw more or less adnate to the column, appressed to it only in a few species; the blade is spreading and usually deeply lobed.

The *column* is often narrow and semi-terete, sometimes with two small wings or auricles.

The *pollinia* are four, ovate or flattened, two in each anther cell, where they are separated by a septum or partition.

The *capsule* is ovoid or oblong with six prominent ribs, sometimes winged.

Nevertheless the essential character of Epidendrum and that by which a flower is most easily recognised as belonging to the genus, consists in the lip being appressed or more or less united to the column. With the vegetative organs of Epidendrum the case is not so simple, for throughout the genus, even as it now stands, there exist remarkable differences in habit, and it is upon these differences chiefly that the sectional divisions of the genus have been founded; the extent of the attachment of the lip to the column being also regarded as an important character for the same end. As the sectional divisions have a practical use in the operations of the cultivator, we here give the leading features of each as enunciated by Bentham.

* Walp. Ann. Bot. vol. VI. p. 311, et seq. and Xen. Orch. II. pp. 27—36.

I. **BARKERIA.** Stems either scarcely or at all thickened, or forming narrow spindle-shaped pseudo-bulbs, 2—4 (rarely more) leaved at the top. Lip shortly adnate to the base of the column.

This section includes the Barkerias of Knowles and Westcott, and *Epidendrum Skinneri*.

II. **ENCYCLIUM.** Stems usually more or less thickened into oval or elongated pear-shaped pseudo-bulbs that are 2—3 leaved at the top. Lip adnate to the base of column to less than half its length.

The species in this section are very numerous, and were classified by Lindley into three series, thus—(1) *Holochila*, labellum quite entire as in *Epidendrum Brassavolæ*, *E. vitellinum*, *E. prismatocarpum*, etc. (2) *Sarcophila*, labellum thickish and minutely toothed as in *E. glaucum*, *E. ochraceum*. (3) *Hymenochila*, labellum three-lobed, petal-like, as in *E. atropurpureum*, *E. nemorale*, *E. dichromum*, etc.

III. **AULIZEUM.** Stems more or less thickened into elongated spindle-shaped pseudo-bulbs, 1—2 (rarely 3) leaved at the top. Lip adnate to the column to the apex of the latter.

This includes two sub-sections—(1) *Schistochilæ*, labellum tri-partite, or more or less three-lobed, as in *E. ciliare*, *E. falcatum*. (2) *Holochila* (Benth.), *Osmophytum* (Lindl.), labellum quite entire as in *E. cochleatum*, *E. inversum*, etc.

IV. **EUEPIDENDRUM.** Stems cylindric, reed-like, 3—5 feet long, leafy; leaves distichous and alternate. Lip adnate to the column the whole of its length.

This is the largest of the sectional divisions, and includes most of the species with densely racemose and paniculate inflorescence. These have been arranged by Bentham into ten series, distinguished chiefly by the habit of the plant and the form of the inflorescence; the most important of these series, in a horticultural sense, are the third (*Nutantes*), including *E. cnemidophorum*, *E. Cooperianum*, and the sixth (*Amphiglottideæ*), including *E. cinnabarinum*, *E. euctum*, *E. radicans*, *E. xanthinum*, etc., etc.

V. **PSILANTHEMUM.** Stems leafy, thickened into spindle-shaped pseudo-bulbs. Inflorescence produced from the base of the stem, not terminal as in the other sections.

This section includes one very distinct species only—*E. Stamfordianum*.

Geographical distribution.—No genus of epiphytic orchids, *Dendrobium* perhaps excepted, is spread over an area so vast and continuous as *Epidendrum*. The species are scattered over well-nigh the whole of the South American Continent from the southern tropic to the isthmus; they are also abundant in Central America, the West India Islands, and Mexico. Three species, *Epidendrum cochleatum*, *E. tampense*, and *E. conopseum*, occur within the territories of the United States; the last named is frequent on evergreen trees near the coast from Louisiana to

Port Royal in South Carolina; it is therefore the most northern epiphytal orchid known in the western hemisphere. Of the four hundred described species that are spread over this great region, by far the greater number have been gathered in elevated localities, especially on the Andes from Bolivia northwards to the isthmus, and their continuation through Central America to the Mexican plateau, where and throughout the West Indies the Epidendra are among the commonest of orchids, in some places forming immense tufts that literally strangle the trees to which they attach themselves. So far as at present known they are less abundant within the Brazilian territories, but several are reported from the Organ Mountains and the Serras of Minas Geraes. Throughout the mountain districts they usually occur at a moderate elevation like the Cattleyas and Lælias, but there are some remarkable exceptions—thus it is said of *E. frigidum*, “a singular plant with stems a foot and a half high, densely covered with leaves and bearing racemes of small pale rose flowers, grows on wet rocks at but little distance from perpetual snow at the height of 13,000 feet, both on the Sierra Nevada of Merida in Venezuela and the volcano of Pasto in Peru.* While a great number of the species are restricted to localities of limited extent there are some as *E. ciliare*, *E. fragrans*, and *E. variegatum* that are distributed over an enormous area, and others again like *E. frigidum* mentioned above, which although not common have been gathered in localities widely remote from each other.

Cultural Note.—The greater number of the species described in the following pages have been introduced either from the mountain regions of South America, where they occur at elevations and live under climatic conditions similar to those of the New Granadian Cattleyas, or from the elevated plateau of Mexico and Guatemala, where they are found under nearly the same conditions as *Lælia anceps* and its immediate allies *L. autumnalis*, *L. rubescens*, &c. The cultural treatment of the Epidendrums is thence easily deducible from a knowledge of their habitat, or more comprehensively from their sectional classification, thus—those species included in the AULIZEUM and EUEPIDENDRUM sections, and which have cylindric or fusiform stems† may be associated for cultural purposes with the Cattleyas of the *labiata* group, that is to say, they should receive the same cultural treatment as those Cattleyas; and those included in the ENCYCLIUM, and which have ovoid pseudo-bulbs, and all the Barkerias may

* Lindley, Fol. Orch. Ep. No. 286.

† *Epidendrum crenidophorum* and *E. Stamfordianum*, although having fusiform stems, being natives of the mountains of Guatemala should be grown with the Mexican Lælias.

be cultivated in the same house and under the same conditions as the Mexican Lælias. No cultivator need be under any apprehensions of failure from adopting the sectional divisions as a basis for cultural purposes as here suggested; the classification of the Epidendra sketched above is so simple that no one of ordinary intelligence would scarcely fail to assign to any species brought before him, its correct sectional place. As we have given the cultural treatment of the Cattleyas and Lælias in detail under their respective headings, those details need not be repeated here.

Epidendrum alatum.

ENCYCLIUM. Pseudo-bulbs pyriform, 3—4 inches long, di-triphyllous. Leaves lorate, leathery, 12—15 inches long. Peduncles erect, purplish, longer than the leaves, paniculate, many flowered. Flowers fragrant, 2 inches in diameter; sepals and petals similar, linear-spathulate with revolute margin, the basal half pale greenish yellow, the distal half brownish purple; the side lobes of the lip sub-quadratae, erect, pale yellow with a few red streaks at the base; the middle lobe broadly deltoid, undulate, light yellow bordered with orange and traversed longitudinally by several lines of minute purple hairs.

Epidendrum alatum. Batem *Orch. Mex. et Guat.* t. 18 (1839—43). Lindl. *Fol. Orch.* Ep. No. 53. *E. calochilum*, *Bot. Mag.* t. 3898. *E. longipetalum*, Lindl. in *Paxt. Fl. Gard.* I. t. 30 (1850). *E. formosum*, Klotzsch, *Allg. Gart. Zeit.* 1853, p. 201.

Discovered by Mr. G. Ure Skinner in 1837, in Honduras, growing in company with *Epidendrum Stamfordianum*; afterwards detected by Hartweg, in Guatemala. It has since been frequently imported with other Central American orchids.

E. arachnoglossum.

EUEPIDENDRUM. Stems cylindric, 3—5 feet high, leafy above. Leaves sessile, ovate-oblong, obtuse, 3—4 inches long. Peduncles almost entirely invested with closely adherent scarious bracts and terminating in a dense many-flowered nodding raceme. Flowers on greenish crimson pedicels an inch long, rich magenta-crimson, except the orange-yellow fleshy disk of the lip; sepals and petals similar, elliptic-oblong; the petals with toothed margin, the sepals entire; lip three-lobed, each lobe spreading and fimbriated, the midline one with a deep cleft in the anterior margin. Crest consisting of four bright orange central teeth, with a smaller white one on each side and a broad denticulate plate in front.

Epidendrum arachnoglossum, Rchb. ex. André in *Révue Hort.* 1882, p. 554.

Discovered by M. Edouard André, in 1876, on the volcano of Puracé, in southern New Granada, at an elevation of 6,000 feet, in limited numbers, growing upon trees in company with *Epidendrum paniculatum*. M. André was also the introducer of the plant, and the first to flower it in Europe. Owing to the slow elongation of the

rachis after the lowermost flowers have expanded, the raceme continues in bloom four or five months.* A variety called *candidum*, differing nothing from the species except in the flower being dull white instead of magenta-crimson, is described in the *Gardeners' Chronicle*, XXV. (1886), p. 362. The specific name, literally "spider's-tongue," refers to the form of the labellum.

E. aromaticum.

ENCYCLIUM. Pseudo-bulbs sub-globose, smooth, pea-green, 2—3 inches in diameter, di-triphyllous. Leaves linear, rigid, 9—12 inches long. Scape 2—3 times as long as the leaves, much branched. Flowers numerous, fragrant, about an inch in diameter; sepals and petals oblong-lanceolate, pale primrose-yellow; lip three-lobed, the side lobes oblong, oblique, appressed to the column except at their apex, the middle lobe rotund, whitish streaked with red.

Epidendrum aromaticum, Batem. *Orch. Mex. et Guat.* t. 10. (1843). Lindl. Fol. Orch. Ep. No. 55. Saunders, *Ref. Bot. II.* t. 89. *E. incumbens*, Lindl. in Bot. Reg. 1840, misc. No. 84.

Native of Guatemala, whence it was sent to Mr. Bateman by Mr. G. Ure Skinner, in 1835. Its pleasant fragrance is its chief recommendation. The colour of the sepals and petals varies in different plants from dull olive-green shaded with brown to pale primrose-yellow.

E. atropurpureum.

ENCYCLIUM. Pseudo-bulbs ovoid, 3—4 inches long, di-triphyllous. Leaves lanceolate or linear-oblong, 12—15 inches long, often dull greenish purple. Peduncles stoutish, erect, half as long again as the leaves, and terminating in a 5—10 flowered raceme. Flowers among the largest in the genus, 2½ inches in diameter; sepals and petals obovate-oblong with incurved tips, chocolate-brown in the centre, pale yellow-green at the base and apex; lip three-lobed, the lateral lobes oblong, erect with the tips turned away from the column, white streaked with pale purple; the middle lobe broadly obovate, undulate, white with a purple blotch near the base. Column triquetral, white; anther orange-yellow.

Epidendrum atropurpureum, Widenow, Sp. Pl. IV. p. 115 (1805), ex. Rehb. in Bonplandia, 1854, p. 19. Williams' *Orch. Alb.* IV. t. 149. *E. macrochilum*, Hook. *Bot. Mag.* t. 3534 (1836). Lindl. Fol. Orch. Ep. No. 79. *The Garden*, XXXII. (1887), t. 619.

var.—*Randianum*.

Leaves of a deep purplish hue, longer and narrower than in the type. Flowers somewhat larger with broader sepals and petals that are scarcely undulated, these organs are russet-brown bordered with light yellow-green; side lobes of lip broader, more rotund and more

* As in *Epidendrum cinnabarinum*, *E. erectum*, *E. elongatum*, *E. xanthinum* and other species in sub-section *Amphiglottidea*.

spreading, the intermediate lobe white with a red-purple rayed blotch on the disk.

E. atropurpureum Randianum, L. Linden et Rodegas in *Lindenia*, II. t. 1. E. Randianum, B. de Rodr. *fide* Linden and Rodegas.

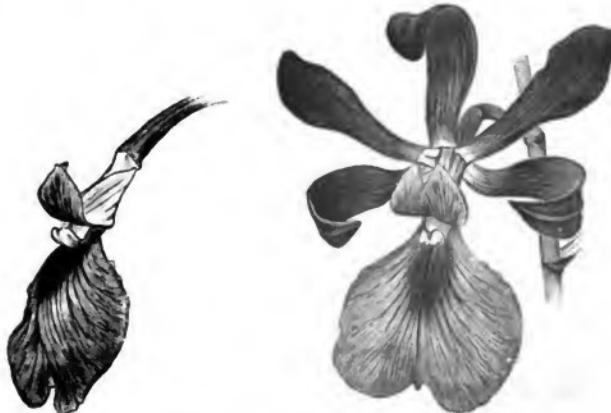
var.—roseum.

Flowers smaller than in the white-lipped form; sepals and petals deep purplish brown; lip rose colour with a purple blotch near the base.

E. atropurpureum roseum, Rchb. in Linden's *Pesc.* t. 27. *Illus. hort.* 1868, t. 541. E. macrochilum roseum, Batem. *Orch. Mex. et Guat.* t. 17. Paxt. *Mag. Bot.* XI. p. 243. Van Houtte *Fl. des Serres*, IV. t. 372 (copied from Paxton).

sub.-var.—roseo-purpureum, sepals and petals deep chocolate-brown, the whole of the lip magenta-purple.

This species is better known in British gardens under the name of *Epidendrum macrochilum* than under that we have described it above, but which we have adopted on the authority of Reichenbach, who quotes in *Bonplandia*, 1854, p. 19, Wildenow's description of an herbarium specimen gathered by Humboldt and Bonpland between Santa Barbara and Puerto Cabello, in Venezuela, in the



Epidendrum atropurpureum, var. roseum.

beginning of the present century, and which was published many years prior to the appearance of Sir William Hooker's *E. macrochilum* in the *Botanical Magazine*.

Epidendrum atropurpureum has a wide range in Central and South America; it was first detected by the travellers Humboldt and Bonpland as stated above; many years afterwards it was gathered

by Wagener and Purdie near Caracas, and by Mr. G. Ure Skinner in Guatemala, growing in company with the beautiful Cattleya that bears his name; it has also been received from Mexico, Panama, and New Granada, and quite recently the very distinct variety described above under the name of *Randianum*, which was first discovered at Teffé, on the south bank of the Amazon, 1,500 miles above Pará, has since been brought from Itaituba, near the Tapejos Falls, upwards of 1,000 miles distant from Teffé.* *E. atropurpureum* was first introduced by Mr. Horsfall, of Liverpool, in whose collection it flowered in 1836. The variety *roseum* was introduced by Mr. G. Ure Skinner from Guatemala, where the flower is known among the natives by the name of Boca del Dragon or "Dragon's Mouth." The variety *Randianum* was sent by Mr. E. S. Rand, of Pará, to the Compagnie Continentale d'horticulture de Bruxelles in 1885.

E. aurantiacum.

AULIZIUM. Stems clavate, attenuated below, 10—12 inches long, diphyllous. Leaves linear-oblong, acute, 4—6 inches long, very leathery. Peduncles issuing from a pale membranous spathe, shorter than the leaves, 6—12 flowered. Flowers $1\frac{1}{2}$ inches in diameter, orange-red; sepals and petals similar and sub-equal, lanceolate, acute; lip ovate, convolute over the column at the base, reflexed at the apex. Column pale greenish yellow.

Epidendrum aurantiacum, Batem. in Bot. Reg. 1838, misc. 11. Id. *Orch. Mex. et Guat.* t. 12 (1843). Lindl. Fol. Orch. Ep. No. 1 (1853). Regel's *Gartenfl.* (1856), t. 158. *E. aureum*, Lindl. *fide* Hemsl. in Gard. Chron. XX. (1883), p. 42.

Introduced in 1835 by Mr. G. Ure Skinner, from Guatemala, where it is said to be plentiful in some localities, sometimes growing on exposed rocks where it is subject to great extremes of heat and cold. It was also detected by Karwinsky and other travellers in Mexico, growing on trees, especially on *Taxodium mexicanum*, as well as on bare exposed rocks. The plant has altogether the habit of a Cattleya, with which also it agrees in the lip being united to the base of the column only and not adnate to it. Except its smaller flowers it possesses scarcely any character to distinguish it from Cattleya.†

* E. S. Rand in lit.

† *Epidendrum aurantiacum* characteres potius Cattleyæ ostendit a qua vix nisi floribus minoribus distinguitur (Benth. et Hook. Gen. Plant. III. p. 529), especially *Cattleya Skinneri*, from which it can scarcely be distinguished when not in flower. It has been found growing with this Cattleya upon the stem of the same tree, and among one of our importations of *C. Skinneri* many years ago was a plant that bore strong traces of being a natural hybrid between that species and *E. aurantiacum*. See *Cattleya (Epicattleya, guatemalensis) ×*, Part II. p. 86.

E. auritum.

ENCYCLIUM. Pseudo-bulbs placed at intervals of about an inch on a stoutish ascending rhizome, oval-oblong, compressed, $1\frac{1}{2}$ inches long, monophyllous. Leaves narrowly ligulate, 6 inches long. Peduncles from the axis of the young growths, as long as the leaves, sheathed at the base by imbricating green scales, 3—5 flowered. Flowers an inch in diameter with a rather strong apple fragrance; sepals and petals light yellow, keeled behind, the sepals lanceolate, acuminate, spreading, the petals much shorter, linear-oblong, erect, reflexed at the tip; lip linear-oblong, scarcely appressed to the column, not lobed, with a broad keel beneath that is dilated at the apex, of a deeper yellow than the other segments, and with a purple stain at the base. Column three-toothed at the apex, yellow with a purple marginal line round the stigma.

Epidendrum auritum, Lindl. Bot. Reg. 1843, misc. No. 4. Id. Fol. Orch. Ep. No. 13. *Dinema pubescens*, Lindl. Bot. Reg. 1840, misc. No. 112.

First sent to Mr. Bateman, in 1839, from Guatemala by Mr. G. Ure Skinner. It is a curious species, in which the flower scapes are produced from the axis of the young growths before the pseudo-bulbs are matured, and in which the lip is neither lobed nor adnate to the column but attached to its base only and scarcely appressed to it; in other respects it conforms to the sectional characters of **ENCYCLIUM**. For materials for description we are indebted to Mr. G. C. Raphael, of Castle Hill, Englefield Green, who recently received the plant from Mexico.

E. Barkeriola

BARKERIA. A diminutive plant. Stems 2—3 inches high, each furnished with about four linear-lanceolate, acute leaves. Peduncles slender, nodding, 3—5 flowered. Flowers $1\frac{1}{2}$ inches across vertically; sepals and petals similar and sub-equal, elliptic-lanceolate, acute, pale lilac suffused with white; lip oblong with the lateral margins depressed, white with an amethyst-purple transverse blotch near the anterior edge, and sometimes a second smaller one below it. Column greenish white spotted with purple.

Epidendrum Barkeriola, supra. *Barkeria Barkeriola*, Rehb. in Gard. Chron. XXII. (1884), p. 616.

Introduced by Messrs. Sander and Co. of St. Albans, in 1884. Native country not recorded. It is very near *Epidendrum* (*Barkeria*) *elegans*, of which it is probably an alpine form.

E. bicameratum.

ENCYCLIUM. Pseudo-bulbs elongated, ovoid or sub-conic, slightly compressed, $1\frac{1}{2}$ —2 inches long, usually pale pea-green, diphyllous. Leaves

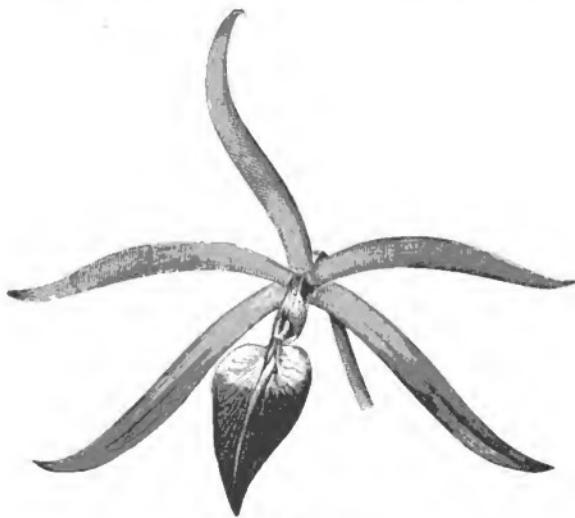
broadly linear, acute, 6 inches long, very leathery. Peduncles erect, 12—15 inches long, issuing from a compressed spathe, slender, glaucous, 15—20 flowered. Flowers about an inch in diameter, inverted; sepals and petals similar and equal, obovate-oblong, apiculate, deep sepia-brown bordered with orange-brown; lip white, three-lobed, the side lobes roundish oblong, incurved over the column, the intermediate lobe transversely oblong, reflexed with a three-ribbed oblong plate at the base, in front of which are three purple spots. Column short, triquetral, greenish.

Epidendrum bicameratum, Rchb. in *Gard. Chron.* 1871, p. 1194. E. Karwinskyi, Rchb. in *Gard. Chron.* 1869, p. 710, not in *Bonpl. IV.* p. 327. E. squalidum, Lindl. *Fol. Orch. Ep. No. 20*, not *Llav. et Lex.*

First discovered by Karwinsky more than half a century ago, in the neighbourhood of Oaxaca in Mexico, and subsequently gathered by Galeotti and other botanical explorers in Central America. It was introduced by us, in 1868, amongst an importation of *Epidendrum vitellinum*, and is still occasionally met with in collections.

E. Brassavolæ.

ENCYCLIUM. Pseudo-bulbs pyriform, elongate, compressed, 4—6 inches long, diphylloous. Leaves spreading, oblong-lanceolate, emarginate, 6—9 inches



Epidendrum Brassavolæ.

long. Racemes issuing from a narrow compressed sheath, 3 inches long, erect, 1—2 feet long, dull crimson and green, 6—9 flowered. Flowers 3—4 inches in diameter; sepals and petals similar, linear-lanceolate,

acute, incurved, reflexed at the tip, nankeen-yellow, purplish behind; lip trowel-shaped, apiculate, with 1—3 longitudinal raised lines, pale yellow but sometimes white at the base, apical area purple. Column green spotted with purple, three-toothed at the apex.

Epidendrum Brassavole, Rehb. in Bot. Zeit. 1852, p. 729. Lindl. Fol. Orch. Ep. No. 7 (1853). Bot. Mag. t. 5664. Batem. in Gard. Chron. 1867, p. 682.

A distinct species first discovered by Warscewicz, in Veragua, on the volcano of Chiriqui at 8,000 feet elevation, about the year 1848, and communicated by him to Professor Reichenbach, who described it in Mohl and Schlechtendal's *Botanische Zeitung* for 1852. It was subsequently found by Mr. G. Ure Skinner on the mountains of Guatemala, and sent by him to Mr. Bateman, in whose collection at Biddulph Grange, in Staffordshire, it flowered in 1867. It has since been frequently imported, and is found to be somewhat variable in the size and colour of the flowers.

E. ciliare.

AULIZETUM. Stems clavate, compressed, 4—6 inches long, diphylloous. Leaves oblong, leathery, 4—6 inches long. Peduncles as long as or longer than the leaves, 5—7 flowered, the pedicels sheathed by large compressed greenish bracts; sepals and petals linear acuminate, 2 inches long, pale yellow-green; lip shorter than the other segments, white, tripartite, the lateral lobes deeply fimbriate, the middle lobe filiform. Column white.

Epidendrum ciliare, L. Sp. Plant. ed. II. p. 1349 (1764). Bot. Reg. t. 784 (1824). Bot. Mag. t. 463. Lindl. Fol. Orch. Ep. No. 90. E. cuspidatum, Lodd. Bot. Cab. t. 10 (1818). Bot. Reg. t. 783.

One of the commonest of Epidendrums and one of the first epiphytal orchids cultivated in British gardens. According to the *Botanical Register*, it was first introduced in 1790, from the West Indies, by a Mr. Elcock; four years later it was among the few epiphytal orchids then cultivated in the Royal Gardens at Kew, and in 1799 it flowered in Mr. Whiteley's nursery at Old Brompton. In the first decade of the present century it was in cultivation in the nurseries of Messrs. Loddiges, at Hackney, and of Mr. Colville, at Chelsea; and from that time to the present it may be assumed to have been rarely absent altogether from the stoves of this country for any lengthened period. *Epidendrum ciliare* is spread over tropical America between the 5th and 20th parallels of north latitude, including several of the West India Islands, varying a little in the size of its stems, inflorescence and flowers in different localities. The plant has the habit of a Cattleya of the *labiata* group, with which it

has sometimes been confused when out of flower; it is frequently imported mixed with *Cattleya labiata Mossiae*. It flowers in December and January.

E. cinnabarinum.

EUEPIDENDRUM. Stems slender, terete, 3—4 feet long, dull purple and green, leafy along the distal half. Leaves ovate-lanceolate, acute, 3—5 inches long, reflexed at apex. Peduncles greatly elongated, bearing at their extremity a dense raceme of bright red flowers, the rachis continuing to lengthen and produce new flowers for several weeks in succession. Flowers 1½—2 inches across, bright cinnabar-red with the disk of the lip yellow; sepals and petals similar and sub-equal, lanceolate, acute; lip three-lobed, the side lobes sub-quadratae with lacinate margin, the middle lobe smaller, oblong, emarginate, constricted near the toothed truncate apex, with two tubercles at the base, and a broad raised median line extending the whole length. Column terete, cinnabar-red, yellow at the apex; anther case green.

Epidendrum cinnabarinum, Lindl. Gen. et Sp. Orch. p. 106 (1831). *Bot. Reg.* 1842, t. 25. *Fol. Orch. Ep.* No. 218 (1853).

First discovered by Salzmann, a German collector, in sandy thickets near Bahia, and afterwards gathered by Martius on the "Serra de Sincorà, and on rocks near Villa Rica in the province of Minas, growing 4—5 feet high." It was imported from Pernambuco by Messrs. Loddiges, in whose nursery it flowered for the first time in May, 1840; it is one of the finest of the red-flowered Epidendrums.

E. cnemidophorum.

EUEPIDENDRUM. Stems stoutish, leafy, 4—6 feet high. Leaves lanceolate, acute, 6—8 inches long. Racemes nodding, many flowered. Flowers fragrant, on long white pedicels sheathed at the base by a small green bract, about an inch in diameter, red spotted with pale yellow, the lip rose colour; sepals oblong-obtuse; petals narrower, almost linear; lip three-lobed, lobes fleshy, entire, the lateral two rotund, the intermediate one obcordate with a deep cleft in the anterior margin, from which to the base are two raised whitish lines. Column clavate.

Epidendrum cnemidophorum, Lindl. *Fol. Orch. Ep.* No. 168 (1853). *Gard. Chron.* 1864, p. 292 and p. 364. *Bot. Mag.* t. 5656.

Discovered by Mr. G. Ure Skinner, who failed to introduce it till 1864, in which year he sent a few plants to some of his personal friends and to our Chelsea nursery, which fortunately survived the voyage. It is a native of the province of Quesaltenango, in Guatemala, where it is found at a considerable elevation on the slopes of deep ravines,

growing amidst ferns and moss, its stems sometimes attaining a height of 6 feet or more. The flowers are among the handsomest of the genus, and under the influence of direct sunlight scent the whole house in which the plant is growing. It is said to be a rare species in its native country, which may account for its being but seldom seen in the orchid collections of Europe. The specific name, from *κυνηγίς-ιδος*, a greave for the protection of the leg, hence "a sheath," and *φορός*, "bearing," refers to the numerous blunt, pale green, spathe-like bracts that sheath the base of the peduncle.

E. cochleatum.

AULIZÆM. Stems pseudo-bulbous, oblong, elongate, compressed, 3—4 inches long, diphylloous. Leaves oblong-lanceolate, acute, 6 inches long. Peduncles erect, longer than the leaves, sheathed by a scarious brown bract at the base, and terminating in a 4—7 flowered raceme. Flowers 3—4 inches in diameter; sepals and petals linear, greenish white; lip sub-orbicular or fan-shaped when spread out, concave, shell-like, apiculate, traversed by numerous radiating lines, deep maroon-purple beneath, yellow-green above with a large maroon-purple blotch on each side; calli, three, white. Column white stained with purple; anther case orange-yellow.

Epidendrum cochleatum, L. Sp. Plant. ed. II. p. 1351. Lindl. Fol. Orch. Ep. No. 128 (1853). *Bot. Mag.* t. 572. *E. lancifolium*, *Bot. Reg.* 1842, t. 50.

One of the few epiphytal orchids known to Linnaeus, and the first on record to flower in this country, which it did in the Royal Gardens at Kew in 1787, it having been sent there the year before from the West Indies by Mr. Hinton East, with *Epidendrum fragrans*, but which did not flower for the first time till a year after *E. cochleatum*.

Epidendrum cochleatum has a wide range in the West Indies, Mexico, and Central America, whence it spreads into New Granada and Venezuela; it is also one of the few epiphytal orchids that occur within the territories of the United States, it having been discovered quite recently at Jupiter Inlet on the Atlantic coast of Florida. The specific name, *cochleatum*, literally "spiral like the shell of a snail," refers to the fancied resemblance of the lip to the shell of some species of snail.

E. conopseum.

EUEPIDENDRUM. "Stems slender, 1—3 inches high, diphylloous. Leaves oblong-lanceolate, acute, 2—3 inches long. Peduncles as long again as

the leaves, 5—6 or more flowered. Flowers scarcely an inch across vertically, pale yellowish green spotted with purple; sepals cuneate-spathulate, spreading; petals similar but narrower; lip three-lobed, the lobes sub-equal, the lateral two roundish oblong, the intermediate one sub-quadratae, emarginate with two white calli at the base. Column reddish at the margin."—*Botanical Magazine*.

Epidendrum conopseum, R. Br. in *Ait. Hort. Kew.* V. ed. 2, p. 219 (1810—13).
Lindl. Gen. et Sp. Orch. p. 106. Id. Fol. Orch. Ep. No. 269. *Bot. Mag.* t. 3457.

This little plant is more interesting from its geographical position than from any other cause, for those floral characters that usually attract the attention of horticulturists are here almost entirely absent. It was discovered in West Florida in the early part of the present century by Drummond, one of the most energetic botanical explorers of the southern States of his time. It is now known to be spread over a considerable part of the coast region, extending from Port Royal Inlet, South Carolina, about lat. 32 N. through Florida and along the northern shores of the Gulf of Mexico, as far as Louisiana. It is occasionally sent by English residents in Florida to their relatives at home, by whom it is cultivated as a souvenir of their absent friends.

E. Cooperianum.

EUEPIDENDRUM. Stems erect, stoutish, 24—30 inches high. Leaves confined chiefly to the upper portion of the stem, oblong-lanceolate, amplexicaul, 6 inches long. Racemes nodding, many flowered. Flowers 1½ inches in diameter; sepals oval-oblong, yellowish brown; petals linear, of similar but brighter colour; lip bright rose, three-lobed, the lateral lobes much the largest, sub-rotund, the intermediate lobe small, reniform, emarginate with a broad raised line from the notch to the base where there are two white calli. Column coloured like the lip.

Epidendrum Cooperianum, Batem. in *Bot. Mag.* t. 5654 (1867). Rehb. in *Gard. Chron.* XVII. (1882), p. 460 (*caloglossum*).

Introduced from the neighbourhood of Rio de Janeiro in 1865. It flowered for the first time in this country in the following year, in the collection of Mr. Cooper, at Alpha House, Old Kent Road, after whom it is named, and shortly afterwards in the late Mr. Dawson's collection, at Meadow Bank, near Glasgow.

E. criniferum.

EUEPIDENDRUM. Stems 12—15 inches high, slender, leafy throughout. Leaves linear-lanceolate, 3—4 inches long, sessile, acute. Racemes sub-erect, 6 or more flowered. Flowers about 2 inches in diameter; sepals

spreading, subulate-lanceolate, acute, yellow blotched with brown-purple; petals linear, similarly coloured; lip three-lobed, the side lobes semi-ovate, fringed with upturned bristles, white; middle lobe linear, straight, pale yellow; calli two. Column white with a purple blotch at the apex.

Epidendrum criniferum, Rchb. in Gard. Chron. 1871, p. 1291. *Bot. Mag.* t. 6094.

Discovered by Endres in Costa Rica, and introduced by us in 1871. The specific name, from *crinis*, "a lock of hair," and *ferre*, "to bear," refers to the fringed side lobes of the lip. The species is still very rare in the orchid collections of this country.

E. dichromum.

ENCYCLIUM. Pseudo-bulbs ovoid-cylindric, 3—4 inches long, diphylloous. Leaves ligulate, acute, 9—12 inches long, very leathery. Peduncles paniculate, 18—24 inches long, nodding, many flowered. Flowers 2 inches in diameter; sepals broadly spatulate, pale rose tinted with ochreous yellow; petals broader, obovate, pale rose; lip three-lobed, lateral lobes rotund-oblong, erect with reflexed anterior margins, which are purple; middle lobe spreading sub-orbicular, emarginate, crimson-purple striated with deep purple, with two fleshy lamellæ on the disc. Column triquetral, with two short wings, white stained with purple.

Epidendrum dichromum, Lindl. in Bot. Reg. 1843, misc. No. 119. *Id. Fol. Orch. Ep.* No. 76, 1853. Rchb. in Gard. Chron. 1866, p. 219. *Bot. Mag.* t. 5491 (amabile). E. amabile, Godefroy's *Orchidophile*, 1887, p. 304.

An exceptionally fine species first introduced from Pernambuco, in 1843, by M. Quesnel, of Havre, and re-introduced in 1864 by Messrs. Low and Co., of Clapton, from Bahia. In its native country it is said to grow "in exposed places on the margin of rivers, establishing itself on the branches of low straggling bushes, and sending its roots down into the sand amidst which they grow." * The flowers are variable in colour, the sepals and petals being sometimes nearly white, sometimes deep rose, while in the form with which we are best acquainted they are as described above. The specific name, $\delta\chi\rho\omega\muος$ (*dichromos*), "of two colours," which is not especially appropriate to this species, was first applied to it by Dr. Lindley on the erroneous information that it had pure white sepals and petals and a rose-coloured labellum.

E. eburneum.

EUEPIDENDRUM. Stems terete, slender, 20—30 inches high, furnished along the upper half with linear-oblong leaves, 3—4 inches long. Peduncles 4—6 flowered. Flowers 3—4 inches across from the top of

* Bateman, in *Bot. Mag.* sub. t. 5491.

the dorsal sepal to the apex of the lip; sepals and petals linear-lanceolate, acute, pale yellow-green; lip orbicular-cordate, slightly concave, ivory-white with two small yellow calli at the base. Column short, stoutish, white.

Epidendrum eburneum, Rehb. in *Gard. Chron.* 1867, p. 404. *Bot. Mag.* t. 5643.

Discovered by Mr. P. Henderson, of the Royal Mail Packet Company's service, by whom it was sent to Mr. T. R. Tuffnell, of Spring Grove, Isleworth, with whom it flowered in December, 1866. It was found within a few miles of Colon, in Panama, growing in swamps close to the railway.

E. elegans.

BARKERIA. Stems terete, 9—12 inches high. Leaves linear-lanceolate, acute, 3—4 inches long. Peduncles as long again as the stems, the rachis blotched with purple and green, sheathed at each joint by an elongated bract, and terminating in a loose 5—7 flowered nodding raceme. Flowers $1\frac{1}{2}$ inches across; sepals and petals nearly equal, obovate-lanceolate, lilac-purple suffused with white. Lip obovate obtuse



Epidendrum elegans.

(Copied from the *Botanical Magazine*.)

with deflexed lateral margins, white with a large rosy purple blotch near the apex. Column spatulate, petaloid, yellow-white dotted with purple; anther yellow.

Epidendrum elegans, Rehb. *Walp. Ann.* VI. p. 374 (1861). *Parkeria elegans*, Knowles and Westcott's, *Fl. Cab.* II. t. 49. *Bot. Mag.* 4784 (1854). Van Houtte's *Fl. des Serres*, IX. t. 959. *Illus. hort. I.* t. 23. Linden's *Pesc.* t. 10. *Fl. Mag.* n.s. t. 394.

This plant, better known in gardens under the name of *Barkeria elegans*, is the typical species of the former genus Barkeria, but afterwards merged by Reichenbach, and subsequently by Bentham, into Epidendrum. It was introduced from Mexico in 1837 by Mr. Barker, of Birmingham, through his collector, Ross; but it seems to have disappeared from the orchid collections in this country soon afterwards. It was re-introduced in 1853 by Mr. Linden, through Ghiesbreght, who collected it on the slopes of the Guerrero Mountains near the Pacific coast of Mexico, north of Acapulco, where it grows chiefly on stunted *Crescentia* trees.*

E. elongatum.

EUEPIDENDRUM. Stems terete, as thick as an ordinary writing-pencil, 12—18 inches long. Leaves oblong-lanceolate, sub-acute, leathery, 2½—3 inches long. Peduncles greatly elongated, jointed with a sheathing bract at each joint, and terminating in a crowded corymbose raceme of bright rose-coloured flowers. Flowers about an inch across; sepals and petals similar and equal, obovate-lanceolate, spreading; lip three-lobed, all the lobes with denticulate margin, the side lobes roundish, the intermediate lobe much larger, obovate-oblong, emarginate; crest bilamellate, the lamellæ toothed, bright yellow.

Epidendrum elongatum, Jacq. Ic. Pl. var. III. t. 604. *Bot. Mag.* t. 611 (1803). Lindl. Fol. Orch. Ep. No. 231 (1853). *E. crassifolium*, Hook. *Bot. Mag.* t. 3543.

A native of Jamaica and probably other West India Islands, that has been in cultivation since the beginning of the present century. It is the typical species of the large sub-section *Amphiglottideæ*, distinguished by the elongated peduncles terminating in short dense racemes of often very showy flowers, that continue a long time in bloom. We are indebted to the Royal Gardens at Kew, for materials for description.†

E. Endresii.

EUEPIDENDRUM. A small plant. Stems slender, 6—9 inches high, leafy throughout. Leaves ovate-cordate, acute, about an inch long, amplexicaul, almost perfoliate. Racemes erect, 9—12 flowered. Bracts subulate, half as long as the stalked ovaries. Flowers on short white

* Linden's *Pescatorea*, sub. t. 10.

† Very near *Epidendrum elongatum* is *E. ellipticum* (Graham) and *E. crassifolium* (Hook. *Bot. Mag.* t. 3543) which is referred by Lindley (Fol. Orch. Ep. No. 230) to Graham's species. On comparing recently received fresh specimens of *E. elongatum* of West Indian origin with the drawing of *E. crassifolium* in the *Botanical Magazine* we failed to detect any essential difference, notwithstanding that the last named was said to have been received from Rio de Janeiro.

pedicels, about an inch across vertically, pure white with a few violet spots on the lip and column; sepals oval-oblong, apiculate; petals clawed, narrower than the sepals, linear-oblong; lip sub-pandurate, the side lobes auriculate, the intermediate one bilobate, the segments divergent. Column short, terete.

Epidendrum Endresii, Rchb. in Gard. Chron. XIX (1883), p. 432. Id. XXII (1885), p. 504, icon. xyl.



Epidendrum Endresii.
(From the *Gardeners' Chronicle*.)

A lovely species. It was discovered by Endres while collecting for us in Costa Rica, in 1873, but who failed to send home living plants. It was re-discovered by Mr. F. Lehmann, in March, 1878, who only succeeded in transmitting to Europe one or two plants

alive.* Nor have the efforts of subsequent collectors met with a much better reward, for after frequent attempts to import it, only a very few plants have survived the voyage. Our description was taken from one that flowered in Sir Trevor Lawrence's collection, at Burford Lodge, in March, 1884.

E. *evectum*.

EUEPIDENDRUM. Stems stoutish, tufted, 3—5 feet high, swollen at the base, leafy almost from the base. Leaves oblong-lanceolate, 4—6 inches long, amplexicaul, acute. Peduncles slender, nodding, 18 or more inches long, bearing at their extremity a loose, many-flowered sub-cylindric raceme. Flowers on reddish-coloured pedicels about an inch in diameter, rich magenta-purple; sepals and petals similar, obovate, obtuse; lip with three fringed lobes, of which the middle one is divided into two spreading segments. Column reddish brown.

Epidendrum evectum, Hook. f. *Bot. Mag.* t. 5902.

This closely resembles *Epidendrum arachnoglossum* described above, from which it is easily distinguished by its more robust stems, its looser racemes of larger and brighter coloured flowers with a differently-shaped labellum; it was known long before the introduction of that species, it having been sent to Kew by Purdie, where it was in cultivation many years prior to its being figured in the *Botanical Magazine* in 1871. It is a native of New Granada, from which country it has since been sparingly imported.

E. *falcatum*.

AULIZEUM. Rhizome as thick as an ordinary writing pencil, from which the stems are produced at intervals of 1—2 inches. Stems like the rhizome 1—2 inches long, monophyllous. Leaves linear-lanceolate, acuminate, fleshy, 6—12 inches long, channelled on one side. Peduncles 2—5 from the axil of the leaf and sheathed at their base by 2—3 pointed bracts 4—6 inches long, one flowered; sepals and petals similar and sub-equal, lanceolate, acute, 2½ inches long, pale yellow-green; lip spreading, the side lobes sub-rhomoidal with a sinus in the outer margin, white, the intermediate lobe acicular, pale yellow-green at the tip; calli two, ovoid, pale yellow. Column white.

Epidendrum falcatum, Lindl. in Tayl. Ann. Nat. Hist. 1840. Id. Fol. Orch. Ep. No. 91 (1853). E. Parkinsonianum, Hook. *Bot. Mag.* t. 3778 (1840). Rchb. in Gard. Chron. IX. (1878), p. 724. E. aloifolium, Batem. *Orch. Mex. et Guat.* t. 25 (1843). E. lactiflorum, A. Rich. *Brassavola Pescatorei*, Hort.

Discovered by Hartweg, in 1837, growing on rocks and loose stones near Oaxaca in Mexico, and shortly afterwards collected by Ross in the

* *Gard. Chron.* XXIII (1885), p. 504.

neighbourhood of Orizaba, for Mr. Barker, of Birmingham, in whose collection at Springfield it flowered in 1839; it was also sent about the same time to the Woburn collection by Mr. Parkinson, Her Majesty's Consul-General in Mexico. The plants sent home by these collectors received different names at the hands of the orchid authorities of that time; Hartweg's specimens were named *Epidendrum falcatum* by Dr. Lindley; the Woburn plant was named after Mr. Parkinson by Sir William Hooker, and Mr. Barker's plant was named *E. aloifolium* by Mr. Bateman. This is to be regretted, for although the plant is not of any special horticultural interest, it is still met with in different collections under all these names. The species is, however, a variable one owing to diversity of station throughout its somewhat extensive distribution. It always grows in an inverted position, whether on the trunks of trees or on bare rocks, where it attains much smaller dimensions, and where it is often exposed to great extremes of temperature and to several months of drought.

E. fragrans.

AULIZEUM. Rhizome stoutish, ligneous. Stems narrowly fusiform, compressed, 3–4 inches high, mono-diphyllous. Leaves lanceolate, acute, 8–12 inches long. Peduncles short, few flowered. Flowers inverted, 2 inches in diameter, very fragrant; sepals and petals reflexed, cream-white, the former ovate-lanceolate, green behind, the latter oval and of the same colour on both sides; lip sub-orbicular, apiculate, concave, with a fleshy callus at the base, white streaked with purple. Column greenish white.

Epidendrum fragrans, Swartz. Fl. Ind. occ. III. p. 1487. *Bot. Mag.* t. 1669 (1814). *Lindl. Fol. Orch. Ep.* No. 122. *E. emulum*, Lindl. *Bot. Reg.* t. 1898 (1836). *E. cochleatum*, *Bot. Mag.* t. 152.

One of the most widely distributed of all the Epidendrums; it is common in Dominica, Jamaica, and other West Indian Islands; it occurs in British, French, and Dutch Guiana, in Northern Brazil and Venezuela; it has also been reported from Guatemala. Over so large an area the plant varies considerably in habit and aspect according to locality and station. A variety called by Dr. Lindley *megalanthum*, "has flowers 4 inches in diameter with vivid stripes of purple-crimson on the lip."* *Epidendrum fragrans* flowered at Kew for the first time in this country in 1778, whither it had been sent by Mr. Hinton East. Some years later plants were pre-

* *Fol. Orch. Ep.* No. 122.

sented to the Apothecaries' Garden at Chelsea by Commodore Gardner, where one of them flowered in February, 1796; it was therefore one of the first epiphytal orchids introduced into British gardens.

E. Frederici Guilielmi.

EUEPIDENDRUM. A robust plant with stems 4—5 feet high, as thick as a man's thumb, but usually smaller under cultivation. Leaves oblong, obtuse, 6—9 inches long. Peduncles sheathed at the base by a spathaceous bract, paniculate, many flowered. Flowers red-purple, 2 inches in diameter, on slender reddish purple pedicels, 3—4 inches long; sepals and petals similar, spreading, cuneate-lanceolate, acute; lip shorter than the other segments, three-lobed, the side lobes rotund, the middle lobe deltoid, acute; calli two, white.

Epidendrum Frederici Guilielmi, Warsc. et Rehb. in Bonpl. II. p. 110 (1853).
Rehb. Xen. Orch. I. p. 158, t. 51 (1856). Illus. hort. 1871, t. 48. De Puydt,
Les. Orch. t. 19.

Discovered on the Andes of northern Peru at 6,000—8,000 feet elevation, about the year 1851, by Warscewicz, who failed to communicate the exact locality. It was rediscovered some years afterwards by Gustav Wallis while collecting plants for M. Linden, of Ghent, but only a single plant of this orchid reached Europe alive. It has since been re-introduced, but in number so restricted that it is still rare in European collections. Its flowers are among the handsomest of the genus, but the unwieldy size of the plant is an obstacle to its finding favour with many amateurs. It was dedicated to the late King Frederick William, of Prussia.

E. fucatum.

ENCYCLIUM. Pseudo-bulbs crowded, ovoid, but sometimes sub-pyriform, elongated, diphylloous. Leaves linear, rigid, 7—10 inches long. Peduncles slender, 2 feet long, branched along the distal half. Flowers very numerous, 1½ inches in diameter, delightfully fragrant; sepals and petals linear-spathulate, deep ochreous yellow; lip free, white streaked with purple, three-lobed, the side lobes erect, linear-oblong, roundish at the apex, the middle lobe obovate; crest bi-lamellate.

Epidendrum fucatum, Lindl. in Bot. Reg. 1838, misc. No. 17. Id. Fol. Orch. Ep. No. 36. E. Sagittatum, A. Rich.

Brought from Havannah in the spring of 1835 by Captain Sutton, and sent to Sir Charles Lemon's collection at Carclew, where it flowered for the first time in July, 1837. Like other Cuban orchids it is now but rarely seen in British gardens; its specific name *fucatum*, literally "dyed," "beautified," probably refers to the labellum.

E. glumaceum.

AULIZIUM. Pseudo-bulbs from a stout ascending rhizome, pyriform, compressed, diphyllous. Leaves oblong-lanceolate, 6—8 inches long. Peduncles erect, as long as the leaves, racemose. Flowers inverted, $1\frac{1}{2}$ inches in diameter; sepals and petals linear-lanceolate, acute, the petals a little broader than the sepals, white striped with pale rose on the inner side, white on the outer side which, owing to the inverted position of the flowers, is most exposed to view; lip obovate, acuminate, stained and streaked with rose in the centre, white at the margin. Column white, spotted with crimson; anther-case yellow.

Epidendrum glumaceum, Lindl. *Bot. Reg.* 1840, t. 6. Id. *Fol. Orch. Ep.* No. 123.

Discovered in 1837 by Gardner, on the Pedro-Bonito Mountain, in the Brazilian province of Pernambuco, growing on branches of *Vellozia candida*, and shortly afterwards introduced by Loddiges, of Hackney. The flowers are pretty and fragrant. The specific name refers to the long, brownish, sharp-pointed scales resembling the glumes of grasses out of which the floral racemes grow, a character which chiefly distinguishes this species from the closely-allied *Epidendrum inversum*.

E Hanburii.

ENCYCLIUM. Pseudo-bulbs ovoid, 3 inches long, diphyllous. Leaves narrowly ensiform, coriaceous, about a foot long. Racemes as long again as the leaves, purple with a small appressed bract at each joint, many flowered. Flowers $1\frac{1}{2}$ inches in diameter; sepals and petals spreading, clawed, spatulate, brown-purple; lateral lobes of lip oval-oblong, erect, claret-purple, the intermediate lobe sub-quadrata, undulate with a median raised line from which branch numerous radiating veins, bright claret-purple. Column triquetral, white at the base.

Epidendrum Hanburii, Lindl. in *Bot. Reg.* 1844, misc. No. 60. Id. *Fol. Orch. Ep.* No. 77. Regel's *Gartenfl.* t. 398.

A species allied to *Epidendrum dichromum* and *E. phænicium*, and sometimes confounded with the last named; it is occasionally imported from Mexico along with other orchids from that country. It was first introduced by Loddiges in 1843, and on its flowering, was dedicated by Dr. Lindley to the late Mr. Robert Hanbury, of The Poles, near Ware. It usually flowers in March and April.

E. ibaguense.

EUPIDENDRUM. Stems terete, as thick as an ordinary writing pencil, 2—3 feet high, leafy upwards. Leaves oblong, acute, 3—4 inches long, amplexicaul, very leathery. Peduncles elongated, terminating in a dense corynbose raceme of bright orange-red flowers with a yellow fleshy tripartite callus on the disk of the lip. Flowers 1— $1\frac{1}{2}$ inches in diameter; sepals oblong, acute, spreading; petals similar but smaller;

lip three-lobed, all the lobes deeply fimbriated, the lateral two cordate, the middle one obocordate, emarginate.

Epidendrum ibaguense, Humboldt et Kunth. Nov. Gen. et Sp. I. p. 352 (1815).
Lindl. Fol. Orch. Ep. No. 233. *Fl. Mag.* 1868, t. 390.

First discovered by Humboldt and Bonpland in the beginning of the present century, on the central Cordillera of New Granada, between Ibagué and Tolima, at 4,500 feet elevation. It was next gathered by Linden, who introduced it into Belgium in 1844; a little later it was found by Hartweg, near Loxa, in Ecuador, and by Jamieson, near Quito. It was first introduced into British gardens from the Ecuadorean Cordillera in 1867, by Messrs. Backhouse, of York.

E. inversum.

AULIZIUM. Pseudo-bulbs fusiform, elongated, compressed, 3—4 inches long, diphyllous. Leaves lorate-oblong, leathery, 4—6 inches long. Peduncles as long as the leaves, sheathed at the base by two opposite whitish brown membranous bracts, racemose, 7—12 or more flowered. Flowers crowded, fragrant, pale straw colour, but sometimes white striated with light rose, with a purple blotch on the lip, and sometimes with a few purple spots at the base of all the other segments; sepals and petals linear-lanceolate with recurved tips; lip obovate, apiculate; calli three, bright yellow.

Epidendrum inversum, Lindl. in Bot. Reg. 1839, misc. No. 125. Id. Fol. Orch. Ep. No. 124.

Native of Minas Geraes in Brazil, whence it was introduced by Messrs. Loddiges in 1839. It is occasionally met with in British collections, flowering in October and November, but sometimes in the spring months; the flowers when first expanded emit an odour somewhat like that of our native Catmint. The specific name refers to the position of the flowers, the labellum being uppermost, but this peculiarity is common to many species of *Epidendrum*.

E. ionosmum.

ENCYCLIUM. Pseudo-bulbs globose, 1½—2 inches in diameter, diphyllous. Leaves oblong-lanceolate, 3—4 inches long. Peduncles racemose at the extremity, few flowered. Flowers fragrant, 1½ inches in diameter; sepals and petals obovate, concave, greenish brown bordered with pale yellow; lip three-lobed, the side lobes oblong, oblique, erect, toothed on the apical side, yellow streaked with red, the middle lobe transversely oblong, emarginate, slightly crisped, yellow with some red streaks and markings.

Epidendrum ionosmum, Lindl. Bot. Reg. 1838, misc. No. 87. Id. Fol. Orch. Ep. No. 73. Rolfe in Gard. Chron. III. s. 3 (1888), p. 716.

Native of British Guiana, whence it was first introduced by Loddiges about the year 1838. Its chief, if not its sole recommendation is the delightful violet fragrance of its flowers, which suggested the specific name. Dr. Lindley remarked* that "the Western world wants no violets where this charming plant is found, for it fills the air with a fragrance as delicate and delicious as that of our favourite wild flower."

E. leucochilum.

EUEPIDENDRUM. A robust plant. Stems from a stout ligneous rhizome, as thick as an ordinary writing-pencil, 15—24 inches high with 3—5 oblong-lanceolate, obtuse leaves at their upper end. Peduncles issuing from a compressed sheath, 5—9 flowered. Flowers on stoutish pedicels, including ovary, 3—4 inches long; sepals and petals similar and equal, linear, acute, reflexed, light yellow-green; lip three-lobed, ivory-white, the side lobes obliquely ovate, entire, the middle lobe linear, acute, keeled above, with two divergent lamellæ at the base. Column terete, forming with the claw of the lip a funnel-like aperture.

Epidendrum leucochilum, Klotzsch in Allg. Gartenzeit, 1843, p. 145 (1844). Lindl. Fol. Orch. Ep. No. 158 (1853). Paxt. Fl. Gard. III. p. 146 with fig. Rchb. in Gard. Chron. III. (1875), p. 780. E. Imperator, Hort.

Found wild in various parts of the eastern Cordillera of New Granada and Venezuela, from Pamplona to Caracas, at 6,000—9,000 feet elevation. It was discovered by Linden in 1842, and subsequently gathered by Schlim and other collectors in different localities. It was in cultivation at the time Lindley compiled the monograph of the genus for his *Folia Orchidacea*, but seems to have been subsequently lost; its reappearance in British gardens in 1875, under the name of *Epidendrum Imperator*, has again brought it under notice.

E. Lindleyanum.

BARKERIA. Stems terete, 8—12 inches high, as thick as a goose-quill. Leaves oblong-lanceolate, acute, 4—5 inches long. Peduncles very slender, 18—24 inches long, nodding, racemose, many flowered. Flowers 2 inches across vertically, bright rosy purple except the white disk of the lip, on slender pale purple pedicels, at the base of which is a subulate, pale green bract; sepals and petals lanceolate, acuminate, the petals broader than the sepals; lip oblong-quadrata, apiculate. Column with narrow wings, three-toothed at the apex.

Epidendrum Lindleyanum, Rchb. Walp. Ann. VI. p. 375 (1861—5). *Bot. Mag.* t. 6098. *Barkeria Lindleyana*, Batem. in Bot. Reg. 1842, misc. No. 5. *Id. Orch. Mex. et Guat.* t. 28. *Paxt. Mag. Bot. XIII.* p. 193.

* Bot. Reg. loc. cit. supra.

var.—*Centeræ*.

Flowers larger with the lip more acute; the column blotched with purple; the flowers generally of a deeper colour, especially the apical portion of the lip.

E. Lindleyanum *Centeræ*, supra. Barkeria *Lindleyana Centeræ*, Rchb. in Gard. Chron. 1873, p. 1597. *The Garden*, XXVII. (1885), t. 490.

var.—*cyclotellum*.

Flowers magenta-purple with disk of lip white; petals and lip broader, the latter emarginate, not apiculate.

E. Lindleyanum *cyclotellum*, supra. Barkeria *cyclotella*, Rchb. in Gard. Chron. XIII. (1880), p. 72. Williams' *Orch. Alb.* IV. t. 148.

This species is better known in cultivation under the name of *Barkeria Lindleyana*; it is of Central American origin and occurs at intervals near the Pacific coast, from Costa Rica to Mexico. It was originally discovered by Mr. G. Ure Skinner, in Costa Rica, and sent by him, in 1839, to Mr. Bateman, in whose collection at Knypersley



Epidendrum Lindleyanum.
(Copied from the *Botanical Magazine*.)

it flowered for the first time in this country, in 1841. The variety *Centeræ* was introduced by us from Costa Rica, in 1873, through M. Endres; it is dedicated to Mrs. Center, the wife of the then superintendent of the Panama Railway. The variety *cyclotellum* is of more recent introduction, and is, we believe, of Mexican origin. The variability of the species is further seen in the various unnamed forms, differing in colour only, that have been sent to us from time

to time by correspondents, one of the most distinct of which had white sepals and petals.

Epidendrum Lindleyanum flowers in November and December, when the rich colour of its elegant racemes of flowers renders it one of the most striking ornaments of the orchid house at that dull season of the year.

E. myrianthum.

EUEPIDENDRUM. Stems cylindric, slender, 3—5 feet high, spotted with black along the upper leafy portion. Leaves linear-lanceolate, acute, 4—5 inches long. Panicles loosely branched, many flowered. Flowers of a uniform bright purplish rose, on long slender purple pedicels; sepals ovate-oblong; petals linear spatulate; lip quadripartite, the basal lobes oblong-obtuse, the anterior two subquadrate, as broad again as the basal two, and with the apical margin denticulate; at the base of the lip are two short, bright yellow lamellæ. Column short, thickened at the apex.

Epidendrum myrianthum, Lindl. Fol. Orch. Ep. No. 184 (1854). *Bot. Mag.* t. 5556.

One of the handsomest of the paniculate Epidendra that was originally discovered by a Mr. Klee on the mountains of Guatemala, but its introduction is due to Mr. G. Ure Skinner, who sent plants to Mr. Bateman, in whose collection at Knypersley it flowered for the first time, many years after its introduction, in June, 1865. We are indebted to Sir Trevor Lawrence, Bart., for materials for description.

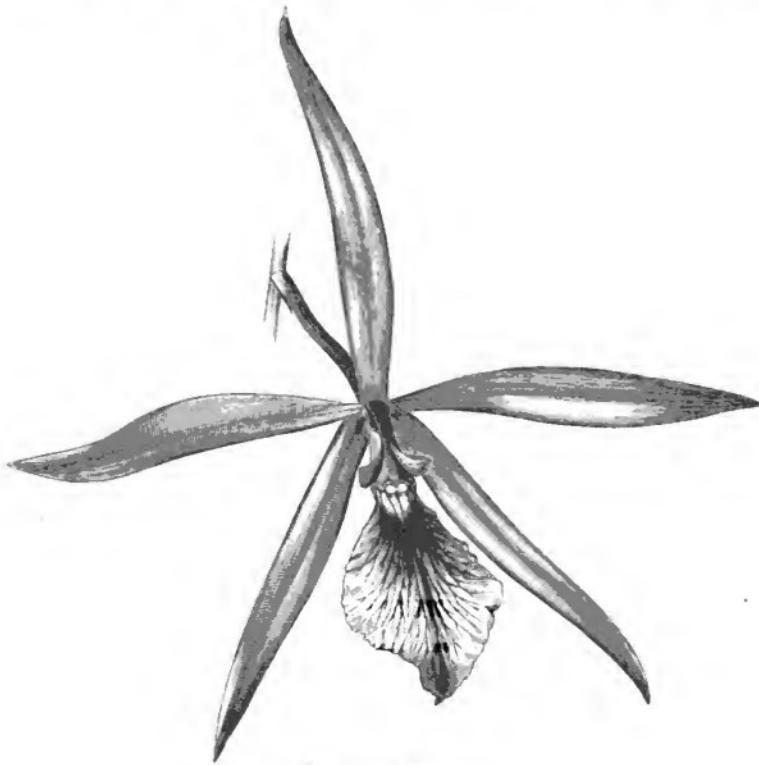
E. nemorale.

ENCYCLIUM. Pseudo-bulbs pyriform or sub-globose, 2—3 inches long, pale green, di-triphyllous. Leaves linear-lorate, very coriaceous, rigid, erect, 9—12 inches long. Peduncles about 2 feet long, reddish green, densely spotted with greyish warts, and terminating in a many flowered panicle. Flowers 3—4 inches in diameter; sepals and petals similar, spreading, linear-lanceolate, light rosy mauve; lip three-lobed, the small side lobes triangular, erect, rosy mauve, the intermediate lobe much larger, ovate-rhomboid, acute with dentate margin, light mauve streaked with purple; callus bi-lamellate, white. Column angulate, winged, rosy mauve.

Epidendrum nemorale, Lindl. in Hook. Jour. Bot. III. 82. Id. Fol. Orch. Ep. No. 60 (1853). Warner's *Sel. Orch.* I. t. 13. Godefroy's *Orchidophile*, 1858, p. 304. *E. verrucosum*, Lindl. not Sw. *Bot. Reg.* 1844, t. 51.* *Bot. Mag.* t. 4606. *Paxt. Mag.* Bot. XIII. (1847), p. 101.

* The original *Epidendrum verrucosum* of Swartz is a very different plant, with simple erect warty stems, and flowers with pale green sepals and petals, and a yellow lip. It is a native of Jamaica and other West India islands.

First imported by Loddiges, from Mexico, about the year 1843. It grows upon trees near Sultepec, and it also occurs in various localities in the province of Oaxaca. *Epidendrum nemorale* is one of the most attractive of the section to which it belongs, but it has frequently proved disappointing to the cultivator; it requires the



Epidendrum nemorale.

same treatment as the *Lælias* and other orchids inhabiting the Mexican highlands, the details of which are given in our introductory notes to *Lælia*, Part II., pp. 53—55.

E. nocturnum.

EUEPIDENDRUM. Stems stoutish, 18—30 inches high, leafy above. Leaves linear, sometimes oblong-lanceolate, 6—8 inches long. Peduncles issuing from a long compressed bract, 8—10 flowered. Flowers on

slender pedicels, 3—4 inches long; sepals and petals linear, acuminate, pale ochreous yellow, sometimes greenish white; lip white, three-lobed, the lateral lobe semi-ovate, crenate with a deep sinus between them, in which is the linear-oblong intermediate one, at the base of which are two yellow (sometimes white) calli, with a raised line between them.

Epidendrum nocturnum, L. Sp. Plant. 1349 (1764). *Bot. Mag.* t. 3298 (1834). *Bot. Reg.* t. 1961 (latifolium). Lindl. Fol. Orch. Ep. No. 254. *E. discolor*, A. Rich. et Galeot. *E. tridens*, Poepp. (*fide* Lindl.). *E. Spruceanum*, Lindl. Fol. Orch. No. 253, ex. Hemsley, Biolog. Cent. Amer. III. p. 235.

Widely distributed through the West India Islands and tropical America from Mexico to Peru. It was one of the true Epidendra known to Linnaeus, to whom it was probably communicated by Jacquin, an excellent French botanist of the last century, who gathered it on the island of Martinique. It was one of the earliest epiphytal orchids introduced into European gardens, it having been in cultivation in 1816 and probably earlier; it usually flowers in the early spring months, when the pleasant fragrance of its flowers, which is most powerful towards evening and at night, is its chief recommendation. *Epidendrum longicolle*, from Demerara* is probably a narrow-leaved, small-flowered geographical form of *E. nocturnum*.

E. ochraceum.

ENCYCLIUM. Pseudo-bulbs elongated, pyriform, 1—1½ inch long, diphyllous. Leaves linear, 3—5 inches long, sedge-like with a depressed mid-nerve above, keeled beneath. Peduncles slender, terete, erect, half as long as the leaves, racemose, 9—12 flowered. Flowers ½ an inch in diameter, with a small acuminate bract at the base of the short ovary; sepals and petals similar, roundish oblong, orange-brown; lip yellow, three-lobed, the side lobes rotund, embracing the column, the front lobe smaller, broadly oblong, emarginate, with a tridentate callus at its base. Column triquetral, three-toothed at the apex.

Epidendrum ochraceum, Lindl. *Bot. Reg.* 1838, t. 26, and misc. No. 15. Fol. Orch. Ep. No. 18.

A small-flowered species discovered by Mr. G. Ure Skinner, in Guatemala, and sent by him in 1835 to Sir Charles Lemon, in whose collection at Carclew it flowered in July of the following year; subsequently it was received by Messrs Loddiges from Oaxaca, in Mexico. It is not uncommon in southern Mexico and Guatemala, whence it is occasionally imported with other orchids.

E. oncidiooides.

ENCYCLIUM. Pseudo-bulbs narrowly oblong, sub-terete, 3—4 inches long, di-triphyllous. Leaves narrowly ensiform, 18—25 inches long,

* *Bot. Mag.* t. 4165.

sub-acuminate, leathery. Peduncles erect or sub-erect, pale green, from 3—4 feet high under cultivation, occasionally much higher in a wild state, loosely paniculate, many flowered. Flowers fragrant, 1½ inches in diameter; sepals and petals clawed, obovate, red-brown margined and striated with yellow, the claw wholly yellow; lip three-lobed, buff-yellow with some red-brown streaks on the front lobe, the side lobes narrowly oblong, the intermediate lobe sub-rotund, cuspidate, with three keels on the disk. Column auriculate at the apex.

Epidendrum oncidiooides, Lindl. *Bot. Reg.* t. 1623 (1833). Id. *Fol. Orch. Ep.* No. 29. *E. affine*, Focke, *Allg. Gartenz.* 1843, p. 229. *E. spectabile*, Id. p. 341. *E. guatemalense*, Klotzsch, Id. 1852, p. 246. *E. graniticum*, Lindl.

First cultivated by Mr. Richard Harrison, of Liverpool, from whose specimen the coloured drawing in the *Botanical Register* was taken; its native country was then unknown. Ten years later it was gathered by Schomburgk on the granite ridges of the rivers Cuyumi and Guayna, in Demerara, and subsequently by Focke, in Surinam. It is a stately species almost entirely neglected by amateurs of the present day.

E. pallidiflorum.

EUPIDENDRUM. Stems terete, 12—18 inches high. Leaves linear-oblong, obliquely emarginate, 5—7 inches long, confined to the upper part of the stem. Peduncles longer than the leaves, drooping, usually paniculate, many flowered. Flowers an inch across, pale yellow, with some purple streaks* at the apex of the column and on the side lobes of the lip; sepals and petals similar and sub-equal, oblanceolate; lip three-lobed, the lateral lobes sub-quadrata, the intermediate lobe similar, with the anterior margin involute and with a thickish raised median line, on each side of which, in front of the column, are two short lamellæ, each with an obtuse tooth.

Epidendrum pallidiflorum, Hook. *Bot. Mag.* t. 2980 (1830). Lindl. *Fol. Orch. Ep.* No. 180.

Native of Dominica (and probably other West India islands), whence it was sent to the Glasgow Botanic Garden, in 1828 or 1829; it is not now often seen in the orchid collections of this country. Its pleasantly-fragrant flowers are produced in profusion in December and January.

E. paniculatum.

EUPIDENDRUM. Stems terete, erect, 3—4 feet high, leafy along the upper portion. Leaves narrowly lanceolate, acute, 5—7 inches long. Panicle 12—15 inches long, many flowered. Flowers fragrant, ¾ inch

* The purple streaks are sometimes entirely absent, or but faintly represented.

in diameter, variable in colour, usually pale rose or lilac, sometimes passing into white; sepals oblong-spathulate; petals filiform; lip quadripartite, the two basal lobes broadly obovate, the anterior two broadly linear, divergent; calli two, sometimes yellow, sometimes white, in front of which are three small raised lines.

Epidendrum paniculatum, Ruiz et Pax. *Flor. Peruv. et Chil.* p. 243 (1794). Lindl. *Gen. et Sp. Orch.* p. 108 (1831). *Id. Fol. Orch. Ep.* No. 174 (1853). *Bot. Mag.* t. 5731. *Illus. hort. N.S.* t. 211. *E. falsiloquum*, Rchb. in *Gard. Chron.* XXIII. (1885), p. 568.

One of the first epiphytal orchids known to science, and one of the most widely distributed of the genus. It was discovered more than a century ago by the Spanish botanists Ruiz and Pavon, near Huayaquil (Guayaquil?) in Peru, and has since been gathered by various collectors in many localities in tropical South America widely remote from each other, but always at a considerable elevation on the Cordilleras from Bolivia northwards to Venezuela. As a species it is very variable, due doubtless to diversity of station and its wide distribution, the variability being observable chiefly in the height of the stems, the form and size of the leaves, and in the colour of the flowers; the date of its first introduction does not appear to have been recorded.

E. patens.

EUPIDENDRUM. Stems cylindric, as thick as an ordinary writing-pencil, 1—3 feet high, jointed at intervals of 1—2 inches, leafy at top only. Leaves oblong-lanceolate, leathery, 4—6 inches long. Peduncles pendulous, usually racemose but sometimes branched at the base, many flowered. Flowers $1\frac{1}{2}$ inches in diameter, yellowish green when first expanded, changing to white with age; sepals and petals sub-equal, oblong, acute with revolute margins; lip three-lobed, the lobes nearly equal, the lateral two roundish, the intermediate one bifid; calli two. Column clavate.

Epidendrum patens, Swartz, *Fl. Ind. occ.* III. p. 1495. Lindl. *Gen. et Sp. Orch.* p. 108 (1831). *Id. Fol. Orch. Ep.* No. 235 (1853). *Bot. Mag.* t. 3800 (1841).

Native of Jamaica, Trinidad, and other West India islands, whence it is occasionally imported with other orchids; it is also said to have been gathered by the late Mr. G. Ure Skinner, in Guatemala. Although not a particularly handsome species, it scarcely deserves Dr. Lindley's somewhat disparaging description; its long pendulous racemes resemble on superficial view those of a *Dendrobium* of the sub-section *Calostachyeæ* (*D. densiflorum*, &c.), a character by which it may be easily recognised among the cultivated Epidendra.

E. *phoeniceum*.

ENCYCLIUM. Pseudo-bulbs sub-rotund, ovate, diphylloous. Leaves linear-oblong, erect, leathery, 6—9 inches long. Peduncles paniculate, 2—3 feet high. Flowers, 1½—2 inches in diameter; sepals and petals sub-equal, obovate-lanceolate, deep bronze-purple shaded with brown and with a pale green apiculus; lip three-lobed, lateral lobes oblong, erect, recurved at apex, the middle lobe sub-rotund, wavy, emarginate, rose purple veined with deep crimson-purple; calli two. Column triquetral, auricled, rose-purple and white.

Epidendrum phoeniceum, Lindl. *Sert. Orch.* t. 46 (1838). *Id. Bot. Reg.* 1841, misc. No. 120. *Id. Fol. Orch. Ep.* No. 78. *Paxt. Mag. Bot.* IX. p. 97. Van Houtte, *Fl. des Serres*, II. 1846, t. 8, and IV. t. 306 (*vanillosum*).

Introduced from Cuba, in 1840, by Messrs. Loddiges, in whose nursery at Hackney it flowered for the first time in this country in the spring of the following year. Although one of the most striking of Epidendrums as regards colour, it is now but rarely if ever seen in the orchid houses of Europe, owing to its inhabiting an island that affords but few orchids worthy of cultivation, and thence the importation of this species has become neglected.

E. *polybulbon*.

ENCYCLIUM. A dwarf creeping plant. Rhizome somewhat wiry, branched and emitting numerous short thread-like roots. Pseudo-bulbs produced from the rhizome at intervals of about an inch, ovoid, ½ inch long, sheathed at the base by brown scales, diphylloous. Leaves ovate-oblong, obtuse, emarginate, 1—1½ inches long. Peduncles issuing from a compressed sheathing bract, slender, as long as the leaves, one flowered. Flowers an inch in diameter; sepals and petals spreading, linear, acute, the petals the narrowest, in one form tawny yellow with a brown median area, in another light yellow; lip white with a short claw and sub-quadrata blade which has a depressed median line. Column purplish brown, with two cirri at the apex.

Epidendrum polybulbon, Swartz, *Prod.* p. 124 (1783). *Id. Fl. Ind. occid.* III. p. 1491. *Hook. Exot. Fl.* II. t. 112. *Dinema polybulbon*, Lindl. *Gen. et Sp. Orch.* p. 111 (1831). *Bot. Mag.* t. 4067.

A native of the West Indies and Mexico that became known to science more than a century ago, but does not appear to have been introduced into British gardens till 1841—2, when plants were presented by Mr. Horsfall, of Liverpool, to the Botanic Garden of that town. It is a dwarf, floriferous, and by no means unattractive species.

E. *prismatocarpum*.

ENCYCLIUM. Pseudo-bulbs ovoid, elongated, tapering upwards, 4—5

inches long, di-triphyllous. Leaves ligulate, flaccid, 12—15 inches long. Peduncles erect, longer than the leaves, bearing along the upper half a many-flowered raceme. Flowers $1\frac{1}{2}$ inches in diameter; sepals and petals similar and sub-equal, oblong-lanceolate, shortly acuminate, pale greenish sulphur-yellow, the sepals with several black purple roundish spots, the petals with fewer spots, sometimes without them; lip with two white rectangular auricles at the base, the blade trowel-shaped, acuminate with two raised lines on the disk, rose-purple tipped with yellow. Column semi-terete, winged, tipped at the apex, pale yellow.

Epidendrum prismatocarpum, Rehb. in Bot. Zeit. 1852, p. 729. Id. *Xen. Orch. II.* p. 83, t. 123. Lindl. Fol. Orch. Ep. No. 23. *Bot. Mag.* t. 5336. Warner's *Sel. Orch. I.* t. 9.



Epidendrum prismatocarpum.

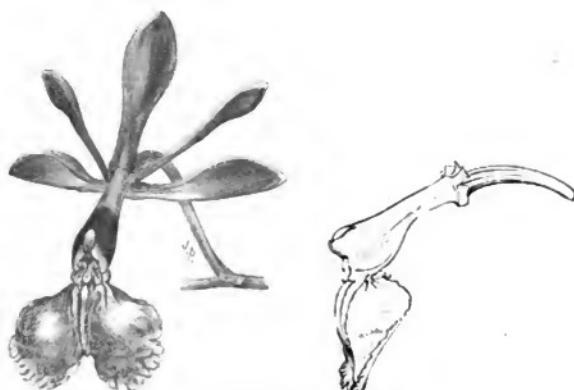
Discovered by Warscewicz, in 1849, on the volcano of Chiriqui, in Veragua, Central America, at 5,000 feet above sea-level, where it flowers in November, but in the glass-houses of Europe it usually flowers from May to August, and occasionally later. It was introduced in 1856 by Bridges. The specific name refers to the three sharp angles of the short ovary.

E. Pseudepidendrum.

EUEPIDENDRUM. Stems terete, 24—36 inches high, brownish-purple and leafy above. Leaves linear-oblong, acuminate, 5—7 inches long. Raceme few flowered. Flowers 2—3 inches across, on slender compressed pedicels sheathed at the base by an acute brown bract; sepals and petals green, the former elliptic-spathulate, the latter linear-spathulate; lip sub-orbicular, retuse, with erose margin, orange-red; disk with five ridges.

Epidendrum Pseudepidendrum, Rehb. *Xen. Orch. I.* p. 160, t. 53 (1856). Id. in *Gard. Chron.* 1872, p. 763. *Bot. Mag.* t. 5929.

This is also one of the discoveries of Warscewicz, who detected it growing upon a species of *Ficus* on the Cordillera of Chiriqui, in Central America, at 4,000 feet elevation, where it flowers in January and February. It was introduced by us in 1871. A sub-variety called *auratum* has a golden yellow lip with a large red disk. The contrast between the bright red labellum and the green sepals and petals is very striking.



Epidendrum Pseudepidendrum.

E. purum.

EUEPIDENDRUM. Stems tufted, cylindric, 12—20 inches high, attenuated below, leafy upwards. Leaves narrowly lanceolate-oblong, 5—8 inches long. Peduncles drooping, paniculate, many flowered. Flowers fragrant when first expanded, less than an inch across, of a uniform pale yellow-green; sepals linear-lanceolate; petals linear; lip three-lobed, the side lobes sub-triangular, the middle lobe oblong, acute with two raised lines at the base in front of the column.

Epidendrum purum, Lindl. in Bot. Reg. 1844, misc. No. 75. Id. Fol. Orch. Ep. No. 289.

Introduced into the collection of the late Mr. Rucker, at West Hill, Wandsworth, in 1844, by Linden, from Caracas; it was subsequently gathered by Purdie, near La Paz, in Colombia, from which country it has been since occasionally imported with other orchids. It flowers in the winter months, when its pleasant fragrance forms its chief attraction.

E. radiatum.

AULIZEUM. Rhizome creeping, ligneous, as thick as an ordinary writing-pencil. Stems shortly fusiform, stalked, 3—5 inches long, much compressed and strongly ribbed, di-triphyllous. Leaves linear-ligulate, sub-acuminate, 10—15 inches long. Racemes issuing from a short compressed sheath, 7—10 or more flowered. Flowers 1½ inches in diameter; sepals and petals reflexed, cream colour, the former narrowly oblong, acute, the latter much broader, oval; lip concave, shell-like with undulate margin, white with radial bright purple lines. Column terete above, green with some purple dots, and with two yellow teeth at the apex between which is a small white fringed lacinia.

Epidendrum radiatum, Lindl. Bot. Reg. 1841, misc. No. 123. *Id.* 1842, t. 45. Id. Fol. Orch. Ep. No. 130. *E. marginatum*, Link, Klotzsch and Otto, Ic. Pl. t. 36. *E. bracteolatum*, Presl. Reliq. Hænk. p. 100 (these syns. ex. Lindl. Fol. Orch. loc. cit.).

First imported from Mexico by Messrs. Loddiges, of Hackney, in 1841, and shortly afterwards sent to the Horticultural Society of London, by Hartweg, who gave no locality. It had been previously detected by Dr. Schiede, growing on rocks at the Hacienda de la Laguna, and it was subsequently found by Galeotti in Oaxaca and other places, and also by Mr. G. Ure Skinner in Guatemala. Its nearest affinities are *Epidendrum cochleatum* and *E. fragrans*, with both of which it has occasionally been confused, especially with the last named, from which it differs in little besides its more strongly ribbed stems, its larger flowers with broader segments, and in the lip not being apiculate.

E. radicans.

EUEPIDENDRUM. Stems scandent, several feet long, often branched near their base, and emitting from opposite the leaves thread-like roots, 12—20 or more inches long. Leaves ovate-oblong, 2 inches long, emarginate. Peduncles slender, sheathed by imbricating adherent bracts, and terminating in a many-flowered corymbiform raceme. Flowers 1½—2 inches in diameter on pale orange-red pedicels; sepals and petals spreading, elliptic-oblong, acute, rich cinnabar-red shaded with deep scarlet; lip with three spreading fringed lobes, of which the middle one is bipartite, bright orange-yellow, deeper towards the margin.

Epidendrum radicans, Pavon M.S. ex. Lindl. Gen. et Sp. Orch. p. 104 (1831), and Fol. Orch. Ep. No. 220 (1853). Paxt. Mag. Bot. XII. p. 145. *The Garden*, XXIV. (1883), t. 412. Williams' Orch. Alb. IV. t. 161. *E. rhizophorum*, Batem. in Bot. Reg. 1838, misc. No. 10.

✓ **sub-var.—*fuscatum*** (*Gard. Chron.* V. s 3. (1889), p. 43), perianth totally suffused with a peculiar purple tint, verging a little to mauve and to reddish brown.

Introduced from Guatemala in 1839 by Mr. G. Ure Skinner, who stated that "in its native country it grows among long grass and dried leaves and flowers from October to January." It was shortly afterwards sent by Hartweg from southern Mexico to the Horticultural Society of London; it flowered for the first time in this country in Mrs. Lawrence's collection at Ealing. *Epidendrum radicans* is the most brilliant of the red-flowered Epidendrums; the plant is of semi-scandent habit, and when trained to a trellis or some such suitable contrivance, its showy flowers are rendered very effective. The sub-variety, which deviates from the type in colour only, is in cultivation in Sir Trevor Lawrence's collection at Burford Lodge.

E. raniferum.

EUPIDENDRUM. Stems terete, erect, leafy along the upper half, 2—3 feet high, jointed, the internodes clothed with membranous striated sheaths. Leaves narrowly lanceolate, acute, 3—5 inches long. Racemes drooping, few flowered. Flowers 2 inches in diameter; sepals and petals spreading in a stellate manner, bright yellow-green spotted with red-brown, the sepals ligulate, convex, the petals linear; lip deeply four-lobed, the two basal lobes obliquely oblong with a cleft in the outer margin which is also irregularly toothed, white with a yellowish stain at the edge; the anterior lobes linear, divergent, yellow; crest two-lobed, white spotted with purple. Column terete, dilated at the apex, greenish white.

Epidendrum raniferum, Lindl. Gen. et. Sp. Orch. p. 109 (1831). Id. Bot. Reg. 1842, t. 42. Id. Fol. Orch. Ep. No. 167. *Fl. Mag.* n. s. t. 445.

This species first became known to science from a dried specimen preserved in Mr. A. B. Lambert's collection, which had been gathered in Mexico. It was probably first introduced in a living state from that country by Mr. Barker, of Birmingham, from whose collection Dr. Lindley received the materials for figuring and description in the *Botanical Register* for 1842, at which time it was in cultivation in several places. A little later it was sent to Messrs. Loddiges, from British Guiana, by Dr. Schomburgk, who met with it on the banks of the River Essequibo growing on the stems of trees.* The species is a variable one, not only in the colour of the flowers but also in the lobing and denticulation of the lip; the Guiana form is distinguished from the Mexican by its brighter yellow flowers with a white lip that is somewhat differently lobed. We are indebted to Sir Trevor Lawrence, Bart., for materials for description.

* Reisen in Britisch. Guiana, III. p. 906.

E. Scepstrum.

AULIZEUM. Stems from a stoutish rhizome, clavate, compressed, 9—12 inches long, bearing near their summits 3—4 ligulate leaves, 8—12 inches long. Peduncles erect, 18—24 inches long, racemose along the distal two-thirds. Flowers inverted, numerous, 1½ inches in diameter; sepals and petals bright golden yellow spotted with blackish purple, the upper sepal and petals linear-oblong, acute, the lateral sepals narrowly spatulate; lip sub-orbicular, apiculate, deep purple, the disk milk-white spotted with maroon-purple. Column greenish.

Epidendrum Scepstrum, Lindl. *Orch. Lind.* No. 50 (1846). *Id. Fol. Orch. Ep.* No. 111 (1853). *Illus. hort. n.s. XXVIII.* (1881), p. 96.

Native of the eastern Cordillera of New Granada, at 5,000—7,000 feet elevation, from Ocaña northwards to Santa Marta, and of the mountains of Venezuela, between Pamplona and Merida. It was first detected by Linden near the Indian village of Jaji (?) growing on the trunks of decaying trees, and was subsequently gathered by other collectors in various localities. It was introduced by its discoverer in 1843. The species is a variable one as regards the size and colour of the flowers.

E. Schomburgkii.

EUEPIDENDRUM. Stems terete, slender, 24—30 or more inches high, leafy along the upper portion. Leaves oblong or oblong-lanceolate, 3—4 inches long. Peduncles greatly elongated, jointed with a linear acuminate bract at each joint, and terminating in a loose corymbose, many-flowered raceme. Flowers 1½—2 inches in diameter, bright vermilion-red, the apex of the column orange-yellow; sepals and petals spreading, similar and sub-equal, linear-lanceolate, acute; lip three-lobed, fringed at the margin, the side lobes broadly rotund, falcate, the intermediate one triangular-cuneate with two median raised lines, at the base of which is a two-lobed yellow callus.

Epidendrum Schomburgkii, Lindl. in *Bot. Reg.* 1838, misc. No. 16. *Id. t. 53. Paxt. Mag. Bot. X.* p. 121. *E. fulgens*, Brongn. *Voy. Duperrey*, t. 43, ex. Lindl. *Fol. Orch. Ep.* No. 219. *E. pristes*, Rchb. in *Gard. Chron.* XXVI. (1886), p. 262.

Discovered by Dr. Schomburgk during his second expedition into the interior of British Guiana in 1837, growing on trees on the banks of the Commewyne River, and sent by him to Messrs. Loddiges, of Hackney, in whose nursery it flowered in the following year. According to Dr. Lindley,* it has also been gathered in Surinam by Focke, at Pernambuco in Brazil by Gardner, and on the Andes of Quito by Jamieson; the geographical distribution of

* *Fol. Orch. Ep.* No. 219.

the species is therefore most remarkable, the two last-named localities being separated from each other by the entire breadth of the South American Continent at its widest part, and both remote from the station in which it was first discovered.

E. *selligerum*.

ENCYCLIUM. Pseudo-bulbs ovoid, clothed when young with pale membranous sheaths, smooth and pea-green when older, variable in size, the largest 3—4 inches in diameter, diphyllous. Leaves linear-ligulate, 9—12 inches long, leathery, deep green. Peduncles 3—4 feet long, loosely paniculate, many flowered. Flowers fragrant, 1½ inches in diameter; sepals and petals similar and equal, clawed, spatulate, concave, brown with a pale margin; lip adnate to the column at the base only, three-lobed, the side lobes spreading, roundish oblong, white, the intermediate lobe ovate, apiculate, crisped, light purple; disk fleshy, scooped. Column triquetral, winged, green above.

Epidendrum selligerum, Batem. in Bot. Reg. 1838, misc. No. 66. Lindl. Fol. Orch. Ep. No. 26.

First sent from Guatemala by Mr. G. Ure Skinner to Mr. Bateman in 1836, and, *sive* Lindley, subsequently detected by Galeotti, near Oaxaca, in Mexico, growing on rocks and trees at an elevation of 3,000 feet. It is occasionally imported with other Mexican and Guatemalan orchids, the plant from which our description was taken being an instance and which flowered in our houses in the summer of 1889. As a species it comes near *Epidendrum ionosnum*, from which its larger-sized pseudo-bulbs and leaves and especially the acute, not emarginate, labellum of its flowers chiefly distinguish it. The specific name, *selligerum* ("saddle-bearing"), refers to the saddle-like disk of the labellum.

E. *Skinneri*.

BARKERIA. Stems slender, 6—12 inches high, resembling those of the smaller fasciculate Dendrobes. Leaves lanceolate, acute, 3—5 inches long. Peduncles slender, a foot or more in length, jointed below with a closely adherent acute whitish bract at each joint, racemose above. Flowers on slender pedicels, 1½ inches long, coloured like the perianth which is bright magenta-purple except the yellow disk and orange lamellæ of the lip; sepals and petals ovate-lanceolate, acute; lip oval-oblong with three long and two short elevated lines, the longer ones confluent at the apex.

Epidendrum Skinneri, Batem. in Bot. Reg. 1836, t. 1881. *Bot. Mag.* t. 3951. Lindl. Fol. Orch. Ep. No. 196. Warner, *Sel. Orch. I.* t. 38. *Barkeria Skinneri*, Paxt. *Mag. Bot. XV.* (1849), p. 1. De Puydt, *Les Orch.* t. 6.

One of the numerous discoveries of Mr. G. Ure Skinner, who sent

it to Mr. Bateman in 1835, in whose collection at Knypersley, in Cheshire, it flowered in January of the following year. It grows upon trees on the mountains near the city of Guatemala at a considerable elevation, where the temperature is intermediate or ranging from 13°—21° C. (55°—70° F.). It has long been well known under the name of *Barkeria Skinneri* as one of the handsomest of winter-flowering



Epidendrum Skinneri.

orchids, but it is now rarely seen in British gardens; it is said to be nearly exterminated in its native country by the clearing of the forests for coffee plantations.

E. spectabile.

BARKERIA. Stems terete, 3—5 inches high, each bearing at its summit 2—4 oblong-lanceolate, acute leaves, 3—4 inches long. Peduncles issuing from a scarious brownish sheath, racemose, 5—10 flowered. Flowers 2—3 inches across vertically, rosy lilac, the lip paler and spotted with deep purple; sepals linear-lanceolate; petals ovate-lanceolate; lip ovate-lanceolate, traversed by 3—5 raised lines.

Epidendrum spectabile, Rchb. Walp. Ann. VI. p. 375 (1861—5). Benth. et Hook. Gen. Plant. III. p. 529 (1883). *Barkeria spectabilis*, Batem. Bot. Reg. 1842, misc. No. 45. Id. *Orch. Mex. et Guat.* t. 33. *Bot. Mag.* t. 4094. Paxt. *Mag. Bot.* X. p. 169.

A very handsome species, now very rarely seen in collections, but where cultivated is known under the name of *Barkeria spectabilis*. It is a native of southern Mexico and Guatemala, inhabiting the mountains near the Pacific Coast at a moderate elevation.* It was first sent from the last-named country by Mr. G. Ure Skinner about the same time as the preceding species, and was subsequently sent

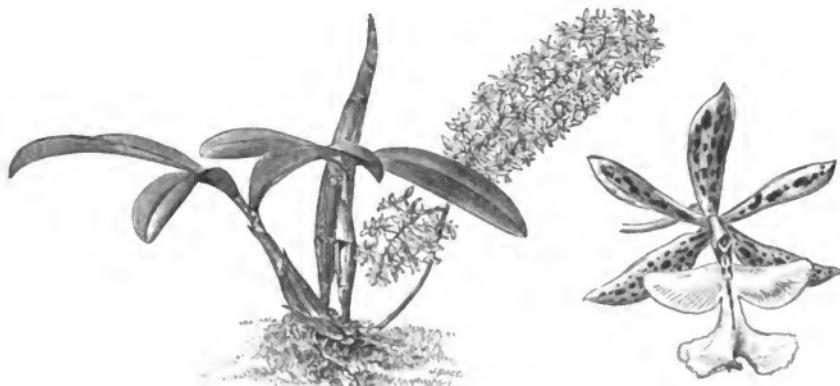
* The localities in which it occurs do not appear to have been recorded.

by Hartweg, from Mexico, to the Horticultural Society of London, in whose garden at Chiswick it flowered in the summer of 1842.

E. Stamfordianum.

PSILANTHEMUM. Stems fusiform, 9—12 inches long, attenuated below into a slender footstalk, di-triphyllous. Leaves oblong-lanceolate, 6—9 inches long. Peduncles from the base of the stems and exceeding them in length, racemose, sometimes paniculate. Flowers numerous, fragrant, 1½ inches across vertically; sepals lanceolate-oblong, acute, yellow spotted with red; petals similar but smaller, narrower at the base, and with fewer but larger spots; lip three-lobed, the side lobes ovate-oblong, white or very pale yellow, the front lobe clawed, transversely oblong with fimbriate margin, yellow; crest bipartite, violet-purple. Column terete, violet-purple at the apex.

Epidendrum Stamfordianum, Batem. *Orrh. Mex. et Guat.* t. 11 (1837—43).
Lindl. *Fol. Orch. Ep.* No. 88. *Bot. Mag.* t. 4759. *E. basilare*, Klotzsch in
Allg. Gart. Zeit. 1843, p. 193. *E. cycnostalix*, Rchb. in *Bot. Zeit.* 1852, p. 731.



Epidendrum Stamfordianum.

var.—Wallacei.

Stems and inflorescence shorter than in the Guatemalian type; sepals and petals yellow densely spotted with purple; lip cream-white spotted with purple.

E. Stamfordianum Wallacei, Rchb. in *Gard. Chron.* I. s. 3 (1887), p. 543.

sub-vars.—Mr. Lee's (*Gard. Chron.* III. s. 3 (1888), p. 521), sepals and petals buff-yellow with purple hieroglyphic markings, lip light rose spotted with purple; **Sir Trevor Lawrence's**, sepals and petals vinous-red bordered with yellow, lip light yellow spotted with rose.

Discovered by Mr. G. Ure Skinner on the shores of Lake Isabel, near San Mico in Guatemala, in 1837, and sent by him to Mr. Bateman, in whose collection at Knypersley it flowered in the spring of the following year. Since that date it has been gathered in various localities in Central America and Colombia by different collectors; its geographical range is thence known to extend from Mexico southwards to a district on the eastern Cordillera of New Granada, south of Bogota. Throughout so extensive a range, the species shows a slight variability in the flower, chiefly in the form of the labellum and in the colour of the perianth. It was named in compliment to the Earl of Stamford, of Enville Hall, Staffordshire. As stated in the introductory notes, the radical inflorescence is peculiar to this species; it thence forms by itself the section **PSILANTHEMUM**.

E. *stenopetalum*.

EUEPIDENDRUM. Stems tufted, cylindric, as thick as an ordinary writing-pencil, 12–24 inches high, the newest formed leafy from the base. Leaves linear-oblong, 3–4 inches long, amplexicaul, emarginate or obtuse, leathery, deep green. Peduncles 5—7 or more flowered. Flowers 1½ inches in diameter, rosy mauve with a square white blotch on the lip immediately in front of the column; sepals lanceolate, sub-acuminate; petals broader, ovate, acute; lip broadly obovate, adnate to the short column to half the length of the latter. Column purple.

Epidendrum stenopetalum, Hook. *Bot. Mag.* t. 3410 (1835). Lindl. *Fol. Orch.* Ep. No. 247. Rolfe in *Gard. Chron.* II. s. 3 (1887), p. 616. *E. lamellatum*, Lindl. *Bot. Reg.* 1843, misc. No. 60.

A species with attractive rose-coloured flowers that was first introduced from Jamaica, in 1834, to the Botanic Garden at Glasgow, where it flowered in February in the following year. It has occasionally been imported since that date, as mention is made of its being cultivated in Mr. Booth's collection at Flotbeck, near Hamburg; in Sir C. Lemon's collection at Carclew, in Cornwall; and quite recently we have received flowers from M. Witte, Superintendent of the Botanic Garden at Leyden, whence plants had been received from Surinam, in Dutch Guiana. It is also said to occur in Honduras, Panama, and near San Cristobal, in Venezuela; its presence in the last named locality, however, seems to require confirmation.

E. Syringothrysus.

EUPHIDENDRUM. Stems slender, erect, 4—5 feet high, leafy upwards. Leaves elliptic-lanceolate, acute, 6—7 inches long. Peduncles clothed with brown sheathing bracts at the base, and terminating in a dense thyrsoid raceme, 5—7 inches long. Flowers an inch in diameter on slender horizontal red-purple pedicels (including ovary) 1½ inches long; sepals and petals spreading, elliptic-lanceolate, red-purple, the petals narrower than the sepals; lip three-lobed, coloured like the other perianth segments with the exception of the white disk on which are three yellow calli, the lobes subquadrate, the middle one apiculate.

Epidendrum Syringothrysus, Rehb. MSS. in horto. Veitchiano, 1868. Id. *Xen. Orch.* III. p. 22. *Bot. Mag.* t. 6145.

First communicated to the late Professor Reichenbach, by Mandon,* who gathered it in 1858 in the neighbourhood of Sorata, in Bolivia, and also in the Andean valley of Challasuya, growing upon rocks amidst shrubs and ferns, a temperate elevated region 8,000—9,000 feet above sea level. It was introduced to our Chelsea nursery by Pearce, in 1868, and flowered for the first time in May of the following year. It is one of the handsomest of the spathaceous Epidendra, but it is still very rare in European gardens.

E. tampense.

ENCYCLIUM. "Pseudo-bulbs ovoid, small and narrowed above, monophyllous. Leaves narrowly linear, 6 inches long by ½ inch broad. Peduncle slender, exceeding the leaves, brownish. Flowers 1½ inches across; sepals linear, obtuse, narrowed below, light yellowish brown; petals similar but more narrowed below; lip white, the front lobe rounded, obtuse, with a number of purple lines that become confluent into a blotch, the side lobes linear with a few faint purple lines. Column greenish white with a pair of short teeth on the angles, and 3—5 purple stripes on the back."—Rolfe in *Gard. Chron.* IV. s. 3 (1888), p. 150.

Epidendrum tampense, Lindl. in *Bot. Reg.* 1847, sub. t. 35. Id. *Fol. Orch. Ep. No. 34.*

First communicated to Dr. Lindley by Dr. Torrey, "the Nestor of American botany," about the year 1847. It is a small slender species, occurring in the neighbourhood of Tampa Bay in Florida, and nowhere else, so far as at present known; it is therefore especially interesting to American orchidologists as being one of the very few epiphytal orchids found wild within the United States territory. It is rarely seen in British gardens.

* *Xen. Orch.* III. p. 22.

E. tigrinum.

AULIZEUM. Stems from a stout, slowly creeping, woody rhizome, subcylindric, slightly compressed, 7—10 inches long, invested below with imbricating brown sheaths, and with two joints near the apex from which the oblong, obtuse, sessile leaves, 6—8 inches long, spring. Peduncles stoutish, erect, longer than the leaves, racemose, 6—9 flowered. Flowers fleshy, scentless, $1\frac{1}{2}$ —2 inches in diameter; sepals and petals oblong, acute, bright yellow-green spotted with black-purple, many of the spots ocellated; lip shorter than the other segments, obovate, obscurely emarginate with three raised lines on the disk, minutely pubescent, nankeen-yellow with a striated red stain in front of the column. Column very thick, trilobate at apex, light nankeen-yellow.

Epidendrum tigrinum, Lindl. *Orch. Lind.* p. 9 (1846). *Id. Fol. Orch. Ep.* No. 116 (1853).

Introduced in 1843 by Linden, who had discovered it in the Merida district of Venezuela, at 5,000—6,000 feet elevation, and occasionally imported since with other orchids from the same region. It is very near *Epidendrum variegatum*, from which it is easily distinguished by its longer and more slender stems, and by its fewer-flowered raceme of larger scentless flowers with a differently shaped labellum.

E. tovarens.

EUEPIDENDRUM. Stems terete, erect, 9—12 inches high, nearly as thick as the little finger, leafy above. Leaves oval-oblong, 4—5 inches long, 1— $1\frac{1}{2}$ inches broad. Peduncles 6—8 inches long, issuing from a long and narrow compressed sheath and terminating in a few-flowered raceme. Flowers milk-white; sepals and petals linear-spathulate, the petals the narrowest; lip three-lobed, the side lobes sub-quadrata, the intermediate one oblong-obtuse, emarginate.

Epidendrum tovarens, Rchb. in *Linnæa*, XXII. p. 838. *Lindl. Fol. Orch. Ep.* No. 160 (1853). *E. sinuatum*, Lindl. *fide* Hemslay in *Gard. Chron.* XX. (1883), p. 634.

Discovered by Wagener about the year 1850, in the Tovar district in Venezuela, where it occurs on the mountains at a considerable elevation; it was subsequently cultivated in the Botanic Gardens at St. Petersburg and other places on the Continent; its first introduction into British gardens does not appear to have been recorded, but it is occasionally imported from Caracas with other orchids from Venezuela.

E. variegatum.

AULIZEUM. Stems fusiform, compressed, 6—9 inches high, tapering

above and below, di-triphyllous. Leaves oblong-lanceolate, obtuse, 6—9 inches long. Racemes longer than the leaves, many flowered. Flowers fragrant, 1—1½ inches in diameter; sepals and petals narrowly obovate-oblong, pale yellow, sometimes yellow-green blotched with purplish brown, the petals smaller than the sepals; lip very short, cordate, acute with two raised longitudinal lines, and a downy callus at the base, bright rose colour, but sometimes white spotted with rose.

Epidendrum variegatum, Hook. *Bot. Mag.* t. 3151 (1832). Lindl. *Bot. Reg.* 1839, t. 11. Id. *Fol. Orch. Ep.* No. 117. *E. crassilabium*, Poeppig. *E. pachycephalum*, Klotzsch. *E. pamplonense*, Rchb.

var.—*coriaceum*.

Stems shorter and thicker; leaves broader, shorter and more leathery. Flowers light yellow spotted with red-brown, the lip paler than the other segments.

E. variegatum coriaceum, Lindl. *Fol. Orch. Ep.* No. 117. *Flor. de Cristo*, vulg. *E. coriaceum*, *Bot. Mag.* t. 3595.

Widely distributed over South America and the West Indies. It is said to have been originally discovered by the French naturalist, Descourtilz, near Ilha Grande, in Brazil, growing on fallen trees fully exposed to the sun. It was subsequently gathered by Mr. W. Harrison, near Rio de Janeiro, and sent by him to his brother at Liverpool, in whose collection it flowered in 1832. In the course of the next twenty years it was detected by various explorers and plant collectors near the Rio Negro in Brazil, in New Granada, British Guiana, Jamaica, and other places. It is one of the most variable of Epidendra, a circumstance that may be accounted for by its great diversity of station throughout its extensive habitat. Specimens collected in many localities widely remote from each other were compared by Dr. Lindley, who was persuaded that the various forms were only varieties of one and the same species, some of which he distinguished by name, but they are now known only in herbaria with the exception of *coriaceum*, which was first introduced from Demerara in 1837; it is very distinct, and is in cultivation in the Royal Gardens at Kew, and at Flotbeck Park, near Hamburg.

***E. varicosum*.**

ENCYCLIUM. Pseudo-bulbs ovoid, 2—3 inches long, prolonged at the apex into a slender di-triphyllous stem, 4—6 inches long. Leaves linear-lanceolate, acuminate, 6 inches long. Peduncles erect, dull purple, 12—18 inches long, racemose along the upper half. Flowers about an inch in diameter; sepals and petals brown, the former linear-oblong, the latter linear-spathulate; lip fleshy, quadrate in outline, 4 cleft, varicose, white

spotted with rose on the basal half; crest tuberclose. Column dull white-brown.

Epidendrum varicosum, Batem. in Bot. Reg. 1838, misc. No. 37. Lindl. Fol. Orch. Ep. No. 71 (1853). Rchb. Xen. Orch. I. p. 163.

First discovered by Mr. G. Ure Skinner in Guatemala, afterwards by Warscewicz in Costa Rica and Veragua, by Galeotti, on porphyry rocks near Oaxaca, in Mexico, at 7,000—8,000 feet elevation, and by Hartweg at the Hacienda del Carmen, in the same country. It has thence an extensive range in Central America, and like all widely distributed species, is found to be variable, especially in the labellum and its calli, from which circumstance it has received many names at the hands of botanists.* It is a curious and distinct plant, well distinguished by its bottle-shaped pseudo-bulbs, its narrow, acuminate leaves, and the short, warty labellum of its flowers.

E. virens.

ENCYCLIUM. Pseudo-bulbs sub-conic, elongated, 3 inches long, invested with a greyish membranous sheath, but bare and furrowed when old, di-triphyllous. Leaves linear, 12—15 inches long. Peduncles loosely paniculate, 24—30 inches long, many flowered. Flowers an inch in diameter; sepals and petals clawed, narrowly oval, pale yellow-green stained with brown in the centre; lip adnate to the column at the base only, three-lobed, white with some purple markings in front of the bilamellate callus, the lateral lobes oblong, oblique, sub-erect, the intermediate lobe sub-quadrata, apiculate, spreading. Column clavate with two small apical wings; green streaked with purple.

Epidendrum virens, Lindl. in Paxt. Fl. Gard. I. sub. t. 30 (1850-51). Id. Fol. Orch. Ep. No. 54. E. Wageneri, Klotzsch. E. ochranthum, A. Rich.;

Abundant in Guatemala and Southern Mexico, whence it is frequently imported along with other more showy orchids from the same region; it was first discovered by Mr. G. Ure Skinner, in Guatemala. *Epidendrum virens* is nearly allied to *E. alatum*, from which it may be distinguished by its narrower leaves and more straggling panicles of smaller flowers of a duller colour.

E. vitellinum.

ENCYCLIUM. Pseudo-bulbs elongated, ovoid, or sub-conic, 1½—2 inches long, diphyllous. Leaves linear-lanceolate, 6—9 inches long, glaucous green. Peduncles slender, nodding, covered with a glaucous bloom, 15—18 inches long, racemose along the upper half, 10—15 flowered. Flowers

* *Epidendrum leiobulbon*, Hook. E. Luneanum, A. Richard. E. quadratum, Klotzsch. E. phymatoglossum, Rchb. E. chiriquense, Rchb. ex. Lindley, Fol. Orch. Ep. No. 71.

1½ inches across, bright cinnabar-red, except the lip and column which are orange yellow; sepals and petals stellate, broadly lanceolate, acute; lip narrower and shorter than the other segments, linear-oblong, thickened in the middle where there is a raised line.

Epidendrum vitellinum, Lindl. Gen. et Sp. Orch. p. 97 (1831). Id. Sert. Orch. t. 45 (1838). Id. Fol. Orch. Ep. No. 4. Bot. Reg. 1840, t. 35. Bot. Mag. t. 4107. Paxt. Mag. Bot. V. p. 49. Illus. hort. I. t. 4 (1854). Van Houtte's Fl. des Serres, X. t. 1026.

var.—majus.

Pseudo-bulbs shorter and thicker, *i.e.*, more truly ovoid. Scapes shorter, erect with a denser raceme of larger flowers with broader segments that are more brilliantly coloured.

E. vitellinum majus, Veitch, Fl. Mag. t. 261 (1866). Jennings' Orch. t. 31. De Puydt Les Orch. t. 20 (copied from Fl. Mag.). Williams' Orch. Alb. I. t. 4.



Epidendrum vitellinum majus.

The typical *Epidendrum vitellinum* first became known to science from a specimen preserved in Mr. Aylmer Lambert's herbarium, which is said to have been collected by Dr. Coulter, in 1830, on the high mountains near Xalapa, in Mexico; it was shortly afterwards gathered by Karwinsky, and later by Galeotti on the Sierra of Oaxaca, at 6,000—7,000 feet elevation, and subsequently by Mr. G. Ure Skinner in Guatemala. The first living plants received in England were collected by Hartweg on the Cumbra of Totontepeque, and the first to flower in England was one in Mr. Barker's collection at Springfield, near Birmingham, in 1839. A few years later some plants were received at Kew from Oaxaca, which flowered in the Royal Gardens in 1844. *E. vitellinum* continued to be comparatively rare in European gardens till M. Roezl some twenty years later collected a considerable quantity of the variety *majus*, which he succeeded in sending to Europe in good

condition. M. Roezl had previously met with the old form on the Cofre de Perote, but the plants sent to Europe (the variety *majus*) were obtained near the Vera Cruz and Mexico railway, a few leagues from Orizaba, growing upon old and stunted oaks in a district where it rains regularly from one to two hours a day from May to October, and where from December to February dense fogs are common and frosts are by no means rare during the night,* but in the hottest months the temperature ranges from 15°—21° C. (60°—70° F.). From that time to the present *E. vitellinum majus* has been universally recognised as the finest Epidendrum of its colour in cultivation; the original type is now but rarely seen.

E. Wallisii.

EUEPIDENDRUM. Stems slender, erect, 4—6 feet high, leafy above, the internodes spotted with dull purple. Leaves lanceolate, acuminate, 4—5 inches long. Racemes 3—5 flowered, terminal and from the axils of the uppermost leaves. Flowers about 2 inches across; sepals and petals oblong-obtuse, canary-yellow, spotted with blackish purple, the petals sometimes with but few spots; lip large and spreading, broadly obovate



Epidendrum Wallisii.

in outline with a deep apical cleft and two lateral smaller ones, the margin notched, white streaked and stained with purple, and having three raised orange lines at the base, of which the middle one is the longest. Column short, thick, pale yellow.

Epidendrum Wallisii, Rehb. in *Gard. Chron.* IV. (1875), p. 66 and IX. (1878), p. 462. *Williams' Orch. Alb.* II. t. 74.

Introduced by us in 1874, through Gustav Wallis, who communicated no locality; it is now known to inhabit the Frontino district, on the

* *Belgique horticole*, 1883, p. 233.

western Cordillera of New Granada, growing in light situations at 4,000—7,000 feet elevation. The species is of horticultural merit chiefly on account of its large flowers and the continuity with which they are produced, a strong established plant being seldom out of flower. It is botanically interesting on account of the inflorescence being both terminal and lateral, a peculiarity that has been observed only in one or two other species of Epidendrum.

E. xanthinum.

EUEPIDENDRUM. Stems as thick as a goose-quill, 18—24 or more inches high, dull purple, leafy throughout. Leaves oblong lanceolate, sessile, obtuse, 3—4 inches long, Peduncles nearly as long as the



Epidendrum xanthinum.

(Drawn at Baron Schroeder's, The Dell, near Staines.)

stems, terminating in a dense head of bright yellow flowers that are sometimes tinted with orange; sepals and petals lanceolate, acute; lip three-lobed, all the lobes fringed, the front one deeply cleft.

Epidendrum xanthinum, Lindl. in Bot. Reg. 1844, misc. p. 18. Id. Fol. Orch. Ep. No. 229.

First discovered by Martius, and afterwards gathered by Gardner on the Serro de Frio, in the Brazilian province of Minas Geraes. It was

introduced by Messrs. Loddiges about the same time as *Epidendrum inversum*.

HYBRID EPIDENDRUM.

The only hybrid Epidendrum, obtained artificially, that has flowered up to the present time is that described below, which was raised by Seden, at our nursery, from *E. radicans* and *E. erectum*. It combines in a remarkable manner the characters of the parents;



1, *Epidendrum O'Brienianum*. 2, *E. radicans*. 3, *E. erectum*.
(From the *Gardeners' Chronicle*.)

in habit it much resembles *E. radicans*, as it bears roots along the stems, but the flowers are well nigh intermediate in form, as will be seen from the annexed engraving; in colour they are brilliant carmine, thus blending the purple of *E. erectum* with the bright scarlet of *E. radicans*. It is named after Mr. James O'Brien, of Harrow-on-the-Hill.

Epidendrum Obrienianum.*E. eheetum × E. radicans.*

Stems as in *Epidendrum radicans*, emitting white cord-like branching roots, 12–20 inches long. Flowers $1\frac{1}{2}$ inches in diameter, of a uniform bright carmine, the calli on the lip bright yellow; sepals and petals oblong-lanceolate, longer than in *E. eheetum*, less narrowed at the base than in *E. radicans*; lip with three fringed lobes, as in both parents, the front lobe bipartite; crest consisting of two erect large teeth with two smaller ones behind them, and a rounded keel in front and between them.

Epidendrum Obrienianum, Rolfe in Gard. Chron. III. s. 3 (1888), p. 770.

SUB-GENUS NANODES.

Lindl. in Bot. Reg. 1832, t. 1541.

Nanodes was founded by Lindley upon a small-flowered species* introduced from Rio de Janeiro, in 1829, by the Horticultural Society of London, with which Reichenbach afterwards joined the far more curious and attractive species described below. With these may be grouped two other species inhabiting the Andes of Central and South America, one of which, *Epidendrum (Nanodes) Mattheusii*, has been in cultivation for some time past in the Royal Gardens at Kew.† The type species, *N. discolor*, and *N. Medusæ*, were doubtfully referred to *Epidendrum* by Bentham, to which they conform as regards the union of the lip and the column, but their stems, prostrate in the first named species, and pendulous in *N. Medusæ*, furnished with fleshy glaucous leaves, impart to them a habit so distinct from all the cultivated Epidendra that for horticultural purposes it is better to keep them separate.‡

Epidendrum (Nanodes) Medusæ.

Stems tufted, quite pendulous, as thick as the little finger, 6–10 inches long, sheathed by the imbricating bases of the leaves. Leaves fleshy, lanceolate, acute, 2–3 inches long, glaucous green. Flowers 3 inches across vertically, solitary or in pairs, terminal, with short terete bent ovaries that are pale green spotted with purple; sepals linear-oblong, acute, keeled behind, vinous-red in the middle, green at the base and

* *Nanodes discolor*, now rarely seen in cultivation. The name Nanodes (*νανώδης*) is the Greek word for pigmy.

† Gard. Chron. XXVI. (1886), p. 459.

‡ These characters, distinct as they are from a horticultural point of view, are of sectional value only. The above-mentioned species form the sub-section *Nanæ* of Bentham under *Epidendrum*, Gen. Plant. III. p. 581.

apex; petals similar but narrower and with slightly revolute margin; lip very large, adnate to the column the entire length of the latter, with which it forms a funnel-like tube, the blade sub-orbicular, concave, bifid at the apex, densely and coarsely fringed at the margin, deep vinous purple. Column terete, green spotted with dull purple.

Epidendrum Meduse, Benth. in Gen. Plant. III. p. 531 (1883). *Nanodes Meduse*, Rehb. in Gard. Chron. 1867, p. 432. *Bot. Mag.* t. 5723. Van Houtte's *Fl. des Serres*, XVII. t. 1771.

Introduced in 1867 by Messrs. Backhouse and Son, of York, from the Andes of Ecuador, although probably first discovered a short time previously by Wallis, who sent a rude sketch of the flower to M. Linden of Ghent, by whom it was communicated to the late Professor Reichenbach. It flowered for the first time in this country in the collection of the late Mr. John Day, at Tottenham, in the summer of 1868. It is one of the most singular amongst orchids, "its stout culms, its pale, glaucous foliage, and the extraordinary appearance and lurid purple of the flower give it a most sinister aspect."*

CULTURAL NOTE.—*Nanodes Meduse* should be grown in the Odontoglossum house and receive treatment similar to that given to the dwarf growing Odontoglossums. Pans with ample drainage or teak baskets that can be suspended near the roof-glass should be preferred. The compost of sphagnum moss and peat should be kept constantly moist, and the plant while growing should receive a liberal supply of water. The flowers of this orchid are among the most persistent in the order.

BROUGHTONIA.

R. Br. in Ait. Hort. Kew, ed. II. vol. V. p. 217 (1810—13). Benth. et Hook. Gen. Plant. III. p. 531 (1883).

A small genus including only two known species inhabiting the West Indies, of which the type has long been in cultivation. With this Mr. Rolfe has joined *Leeliopsis dominicensis*, Lindl.,† already described in page 98 of Part II. of this work, on the ground that it conforms to the essential characters of the genus in having four pollinia, in the presence of a spur that is adnate to the ovary, and in the side lobes of the lip embracing the footless column, the two last-named characters clearly separating Broughtonia from Epidendrum into which it was merged by Reichenbach.‡ The genus was dedicated

* Bot. Mag. sub. t. 5723. † Gard. Chron. V. s. 3 (1889), p. 491. ‡ Walp. Ann. VI. p. 324.



Epidendrum (Nanodes) Medusae.

by Dr. Robert Brown to Mr. Arthur Broughton, an English botanist of the early part of the present century.

Broughtonia sanguinea.

Pseudo-bulbs clustered, roundish ovate, sometimes compressed, $1\frac{1}{2}$ –2 inches long, pale pea-green, diphyllous. Leaves linear-oblong, obtuse, 3–4 inches long, very leathery. Peduncles terminal, slender, erect or nodding, 12 or more inches long with a small appressed bract at each joint, racemose along the distal half, 6–9 flowered. Flowers bright crimson-purple with an orange yellow blotch at the base of the lip, $1\frac{1}{2}$ inches in diameter with reddish purple pedicel and ovary; sepals lanceolate, acute; petals oval-oblong, nearly three times as broad as the sepals; lip sub-orbicular with denticulate margin produced at the base into a slender spur that is adnate to the ovary. Column short, dilated at the apex.

Broughtonia sanguinea, R. Br. in Ait. Hort. Kew. ed. 2, V. p. 217 (1810–18).
 Lindl. Gen. et. Sp. Orch. p. 118 (1831). *Bot. Mag.* t. 3076. *B. coccinea*, Hook. *Bot. Mag.* t. 3536 (1836). *Hook. Cent. Orch.* t. 36. *Epidendrum sanguineum*, Sw. Prod. p. 124. Rehb. in Walp. Ann. Syst. VI. p. 324. Van Houtte's *Fl. des Serres*, XXII. t. 2315.

One of the earliest epiphytal orchids cultivated in England, it having been introduced to the Royal Gardens at Kew, in 1793, by Mr. Walter Ewer. It is a native of Jamaica, where it grows upon the old trunks of *Bombax*, *Rhizophora*, *Conocarpus* and other trees not far from the sea-shore, often in company with *Brassavola nodosa*. The colour of its flowers is rich and bright, and of a tint scarcely to be seen in any other orchid in cultivation.

Cultural Note.—*Broughtonia sanguinea* requires but little compost, and it is thence best cultivated in a teak basket, or on a block or raft that can be suspended near the roof-glass. A tropical temperature and a moist atmosphere being essential, it should have a light position in the East India house.

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<i>Thomsonianum</i>	4	<i>Reichenbachiana</i>
PHAIUS—			<i>Wallichiana</i>
<i>albus</i>	19	SPATHOGLOTTIS—	
<i>Bensoniae</i>	19	<i>Augustorum</i>
<i>australis</i>	11	<i>aurea</i>
<i>bicolor</i>	15	<i>Fortunei</i>
<i>Blumei</i>	11	<i>Kimballiana</i>
<i>Cooksonii</i> X	...	16	<i>Lobbii</i>
<i>grandifolius</i>	11	<i>Petri</i>
<i>Humboldtii</i>	12	<i>Vieillardii</i>
<i>maculatus</i>	12	THUNIA—	
<i>Manii</i>	15	<i>alba</i>
<i>irroratus</i> X	...	17	<i>Bensoniae</i>
<i>philippinensis</i>	...	13	<i>Marshalliana</i>
<i>tuberculatus</i>	...	13	<i>Veitchiana</i> X	...
<i>Sedenianus</i> X	...	17	<i>Wrigleyana</i> X	...
<i>Wallichii</i>	15	TRICHOSMA—	
			<i>suavis</i>
				28

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Vol 1
5^o

A MANUAL

OF

ORCHIDACEOUS PLANTS

CULTIVATED UNDER GLASS IN GREAT BRITAIN.

PART II.

CATTLEYA AND LÆLIA,

LÆLIOPSIS, TETRAMICRA, SCHOMBURGKIA AND SOPHRONITIS.

JAMES VEITCH & SONS,

ROYAL EXOTIC NURSERY, 544, KING'S ROAD, CHELSEA, S.W.

1887.

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PRELIMINARY NOTICE.

THIS Manual is being compiled to supply amateurs and cultivators of exotic Orchids with a fuller account of the principal genera, species and varieties cultivated under glass, than is contained in the Manuals hitherto in use.

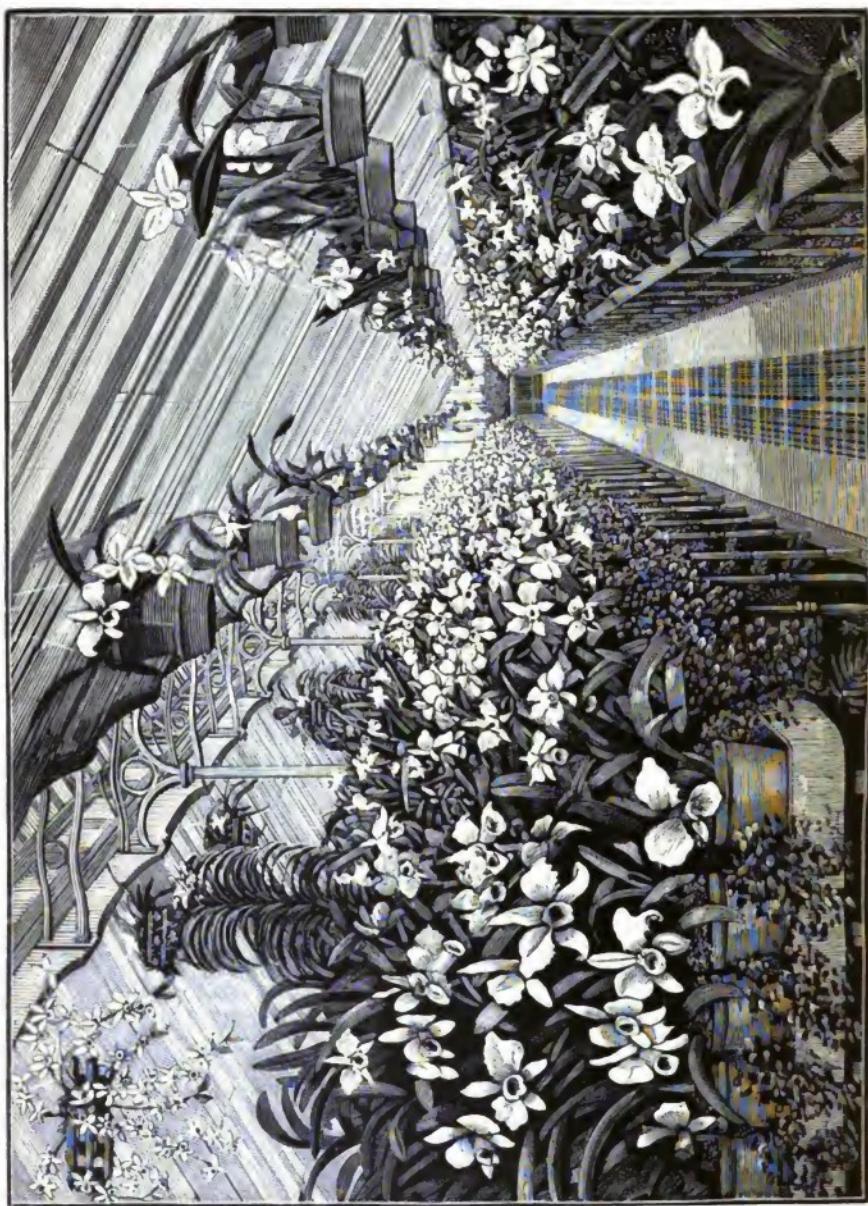
The rapid extension of Orchid culture during the last quarter of a century, resulting from the increased taste for and appreciation of this beautiful and interesting order of plants, has, in our opinion, created the *desideratum* which we are now attempting to supply. The prominent place, too, occupied by Orchids in the columns of the Horticultural Press, and the surprising amount of practical and varied information respecting them disseminated through its agency, has also stimulated the desire to obtain all the leading facts in a condensed form, to which easy reference may at any time be made.

So numerous are the species and varieties of Orchids at present in cultivation, and to which additions are constantly being made by new discoveries and by artificial hybridisation, that the labour attending the compilation of a Manual sufficiently comprehensive to meet the wants of cultivators must necessarily demand much time. Moreover, the present unsatisfactory state of Orchidology, especially in its horticultural aspect and its complicated and unscientific nomenclature, have rendered the compilation of such a Manual within a stated time almost an impossibility.

Under these circumstances, and yielding to the solicitations of patrons and friends, we have decided upon issuing the work in parts, each part containing a monograph of the cultivated species and varieties of one of the most important genera, or of a group of genera.

Little explanation of the plan of the work is here needed; the parts as issued must speak for themselves. We have only to state that in the scientific classification and sequence of the genera we have followed, with but trifling deviations, the arrangement of Bentham and Hooker as elaborated in their *Genera Plantarum*, the most profound and, at the same time, the most intelligible exposition of the Orchideæ extant. In the nomenclature of the species, we have adhered to the Laws of Botanical nomenclature adopted by the International Botanical Congress, held at Paris in August, 1867.

In the description of the species, we have been compelled to use occasionally a few technical terms to avoid cumbrous circumlocutions; at the conclusion of the work we propose giving a glossary of the terms so used. In the cultural notes we have quoted temperatures in the Centigrade scale with the equivalent Fahrenheit readings, in the hope that the far more rational scale, now almost universally adopted in scientific investigations, may also come into use in horticulture. The literary references in italics indicate coloured plates of the species or variety described.



Cattleya House at the Royal Exotic Nursery, King's Road, Chelsea.

CATTLEYA.

Lindl. Collect. Bot. t. 33 et 37 (1821-24); Gen. et Sp. Orch. 116 (1831). Benth. et Hook, Gen. Plant. III. p. 531 (1883).

The Cattleyas, especially those constituting what is generally known as the *labiata* section, have a horticultural importance that is scarcely equalled, and certainly not surpassed by any other branch of the great Orchidean family, the Odontoglossa alone, perhaps, taking equal rank with them in this respect. This pre-eminence is due to the surprising beauty of the flowers of nearly all the species and varieties, which are not only of large size, but are also adorned with a wonderful variety of the most delicate and pleasing tints; especially striking is the labellum or lip, which, in contrast to the softer hues of the other segments, is remarkable for the extreme richness of colour often developed in its anterior lobe, and for the beauty of the pencilings and markings in the throat. The great interest attached to the Cattleyas on account of their splendid flowers, has been further enhanced by the results of hybridisation, not only by the crossing of one species with another, but also by the crossing of Cattleyas with Laelias. In the progeny so raised, many new shades of colour have been obtained, and the various crossings and inter-crossings have also brought into existence new forms which are, however, in nearly every case, well-nigh intermediate between those of the parents.

The essential characters of *Cattleya* are*;—

The *sepals* are free, nearly equal, spreading or rarely connivent.

The *petals* are broader than the sepals, rarely of the same size.

The *lip* is attached to the base of the column and is free; the lateral lobes are broad and generally convolute into a tube which encloses and conceals the column†; the middle lobe is spreading, polymorphous, very distinct from the lateral lobes or continuous with them.

The *column* is rather long, robust, semi-terete, rarely winged, often incurved; the clinandrum is toothed or three-lobed, and the anther case is terminal, convex, or semi-globose, distinctly two-celled.

The *pollinia* are four, in two pairs, compressed, disc-like bodies, parallel with each other, each furnished with a ribbon-like tail, formed of a bundle of highly elastic threads, and covered with numerous pollen grains.

* Abridged from Bentham and Hooker, *Genera Plantarum* loc. cit. supra.

† *Cattleya bicolor* is an exception; in this species the lateral lobes of the labellum are entirely absent.

The *capsule* or fruit is ovoid-oblong, with six prominent ribs, dehiscing longitudinally when ripe into three carpellary lobes.

Comparing these characters with those of *Laelia*, we see that that genus differs but little from *Cattleya* except in the number of the pollinia, which is eight, or in two series of four. Even in the vegetative organs, which, in the systematic classification of the Orchidæ, have not hitherto been much taken into account, no clear line between *Cattleya* and *Laelia* can be drawn, the divergence from their most obvious common characteristics being greatest in some of the Mexican *Laelias* which have pseudo-bulbs of an ovoid form, much resembling those of some of the *Epidendra*.^{*} Indeed, Mr. Bentham remarks that " *Laelia* is so closely allied in every respect to *Cattleya*, that one has great hesitation in accepting the technical distinction of the eight pollen masses in two series, instead of the single series of four, especially as hybrids are so readily produced in cultivation in which the number of pollen masses is variable."[†] Our own experience in the hybridisation of *Cattleyas* and *Laelias* has afforded abundant proof, that not only do the species of the two genera intercross freely, but also that the hybrid progeny crosses with them; it is, therefore, not surprising that the union of the two genera should have been occasionally called for, but which, up to the present time, has not been conceded.[‡] On the other hand, Professor Reichenbach has enunciated an entirely different view of the scientific relations of the two genera; first in Walper's *Annales Botanices Systematicæ*, vol. vi., published in 1861, and afterwards in his *Xenia Orchidacea*, vol. ii., pp. 26-37 and pp. 43-62, a portion of the work that appeared in 1862. In these compilations, both *Cattleya* and *Laelia*, are suppressed as genera, the former being merged into *Epidendrum* and the latter into *Bletia*;[§] a change that he still regards as undoubtedly necessary for science, although he is unwilling to thrust it upon amateurs.[¶]

* But with these *Cattleya citrina* agrees in having ovoid pseudo-bulbs instead of elongated stems. As the pseudo-bulb is only a modification of the stem, arising chiefly from the climatic conditions of the plant's habitat, the difference noted in the text has a minimum value in the scientific classification of the genera.

† Journal of the Linn. Soc. XVIII., p. 315.

‡ Bot. Mag. sub. t. 5553. Illus. Hort. 1859, sub. t. 193.

§ Mr. Bentham dissented from this view. "*Laelia* a Reichenbach ad *Bletiam* relatum, a qua nostro sensu bene distinguitur habitu, foliis, florum forma, etc. *Cattleyæ* tamen quam maxime affinis est, nec separatur nisi polliniorum paribus inferioribus evolutis.—Gen. Plant III., p. 534.

¶ Sander's Reichenbachia I. p. 28.

As epiphytes, the Cattleyas have a vegetation entirely adapted to their mode of life. They have a strong *rhizome* of woody texture, varying in thickness from that of a goose-quill (*C. Aclandiae*, *C. luteola*) to that of a man's little finger (*C. labiata* and its varieties). It is flexuous and creeping, sending out every season from below the latest formed stems, dense fascicles of whitish cord-like roots, which cling firmly to the bark of trees and other surfaces over which they spread.

The rhizome also supports the *stems*, which vary considerably in form in the different species, being spindle-like and club-shaped in *C. labiata* and its varieties, greatly elongated in *C. guttata* and its allies, reduced to an ovoid pseudo-bulb in *C. citrina*, besides many intermediate forms.

The *leaves* are produced at the summit of the stems and are either solitary or in pairs. They are elliptic-oblong or some slight modification of that form, and have always a depressed mid-line above and a shallow keel beneath, are very leathery in texture, and are persistent several years.

The *inflorescence* is terminal, the peduncle issuing from a compressed, spathaceous, sheathing bract, which sometimes has a purplish or brownish tinge.* The number of flowers borne upon each peduncle varies in the different species from one to nine and even more; the number is also variable in the same species, a circumstance that appears to be sometimes influenced by cultivation.

The Cattleyas have alternate seasons of growth and repose. When growing on the trunks of trees in their native country, the masses increase in size in one direction only, which is always the ascending one†; also under cultivation, even in plants many years established, the tendency to increase in size in one direction more than in another is observable. New growth invariably commences in the rhizome at the base of the stem formed in the preceding season; the young shoot first pushes horizontally, to about an inch in the *labiata* group, and then turns upwards; the shoots, while growing, have the appearance of compressed stems invested with distichous, closely appressed, imbricating, leafy sheaths, the uppermost of which are developed into leaves, one or two on each stem, according to the species. When the new growth is matured, the horizontal basal portion is continuous and homogenous with the rhizome, and from it is emitted a dense and spreading fascicle of roots, in some species in the same season, in others in the season following its maturation; the appressed leafy sheaths embracing the stem, lose their leafy character, shrivel and become white and membranous, and in several species eventually fall off.

- In *Cattleya citrina* there are two minute acute, pale bracts at the base of the peduncle.
- † *Cattleya citrina* is a probable exception.

In the glass structures of this country, the Cattleyas usually take from three to four months to complete one season's growth, the period varying according to the meteorological state of the season, being shorter when warm weather with sunshine prevails than when wet and cloudy weather predominates. But although the period of active vegetation is of nearly the same duration with all the species, in the case of many of them it takes place at different times of the year, so that there is scarcely any season of the year in which some are not in active growth and others in a state of rest.*

The general facts stated in the preceding paragraphs may appear to the reader to be somewhat common-place, but the importance of their bearing, in a cultural point of view, will be manifest enough, when the necessity of observing the times of growth and rest in the different species is duly considered.

The genus *Cattleya* was founded by Dr. Lindley upon *C. labiata*, and dedicated to Mr. William Cattley, of Barnet, a liberal patron of horticulture in the early part of the present century, and one of the most ardent collectors of rare plants of his time; he was also one of the first amateurs to form a collection of exotic orchids, of which he possessed the finest then known. At his death, in 1832, this collection passed into the hands of Mr. Knight, our predecessor at the Royal Exotic Nursery, Chelsea.

The genus, as at present circumscribed, includes about twenty known species, with others whose specific rank is at present doubtful, all of which are in cultivation, and are, therefore, described in the following pages. In addition to these are several supposed natural hybrids that have been imported from time to time with the species from which they have been derived, and the still larger number of mules, already mentioned, that have been raised under glass in Europe; these hybrids form the subject matter of a separate section in the present work. No satisfactory sub-division of the genus has yet been suggested, the most important characters being too uniform throughout to offer sectional characters of any decided scientific value; the vegetative organs of *C. citrina*, *C. Aclandiae*, and *C. Walkeriana* are slight deviations

* This is, in a great measure, owing to their geographical range; the species, natives of Mexico and Guatemala, where, in some parts, the rainy, that is, the growing, season lasts from May to October, have opposite seasons to those species, natives of southern Brazil, where the rainy season in some places usually lasts from November to April. The Cattleyas from the Colombia-Guiana region usually conform to our own seasons, growing in summer and resting in autumn and winter; while the South Brazilian species of both *Cattleya* and *Laelia* usually continue their routine of growth, flowering and resting, especially after importation, according to the seasons of their native country, which are, of course, the opposite of ours. Even after being many years established, we have no certain evidence of their entirely adapting their periods of growth and rest to the altered circumstances of our climate, although changes are occasionally perceptible, some species showing great eccentricities in their seasons of growth and flowering; this is particularly the case with *Laelia elegans*, and in a less degree with *Cattleya bicolor*.

from the common type, and the absence of the side lobes of the labellum in *C. bicolor* is an instance of an exception to the general floral structure. For the convenience of horticulturists, we have separated from the other species *C. labiata*, which, with its varieties and numerous sub-varieties, will be frequently referred to as the *labiata* group.

Geographical distribution.—In describing the geographical distribution of the Cattleyas, it will be convenient to associate the Lælias with them, as most of the latter are found growing under the same, or nearly similar conditions. They are all natives of tropical America, and are spread over the immense territory, which extends from near the northern tropic, where it crosses Mexico to about the thirtieth parallel of south latitude. The various species at present known are, however, owing to physical causes, very unequally distributed over this vast region. By far the greater number of them are concentrated in three distinct regions, widely separated from each other, viz.:—(1) in Mexico and Guatemala, in the extreme north of the region sketched above; (2) in the northern part of the South American continent, that extends from the western Cordillera of New Granada to British Guiana; and (3) the maritime provinces of southern Brazil. One of the most striking facts connected with the geographical distribution of the Cattleyas and Lælias, is that with comparatively few exceptions, they occur in localities at a considerable elevation above sea-level, where the average mean temperature is lower than the mean temperature of the same latitude at sea-level. Thus, in Mexico and Guatemala, the finest Lælias brought from those countries inhabit the higher elevations of the *Tierra templada* and even parts of the *Tierra fria*, at altitudes ranging from 6,000—8,500 feet, and where the average mean temperature varies from 10°—20° C. (50°—68° F.), according to the altitude; although it frequently rises to 40°—50° C. (105—120° F.) when the sun is in and near the zenith, and sinks many degrees below the mean through radiation in clear nights. Within this elevated region, there is an alternation of wet and dry seasons; the former lasting from five to eight months, according to the locality, and during which the rains are frequent and heavy; the latter continuing through the remainder of the year, but occasionally interrupted by showers. Owing to the elevation of the Mexican plateau, and its position in respect to the

direction of the north-east trade wind, the atmosphere at night is frequently highly charged with moisture, even during the dry season, and on the western ascent to the higher land, the saturation is almost constant.*

In the Colombia-Guiana region, the splendid Cattleyas of the *labiata* group are always found in the ravines and valleys of the Cordilleras, at elevations ranging from 2,000 to 5,000 feet. In these situations, the plants affix themselves indifferently to the trunks and branches of trees, or to the bare rocks in the gorges of the mountains, in the latter case often fully exposed to the direct rays of a tropical sun by day and the low temperature at night caused by the rapid radiation, and which usually sinks to about 10° C. (50° F), and where, for several months of the year, they are drenched almost daily by the heavy rains brought from the Atlantic by the north-east trade wind. It is observed that the Cattleyas which grow in these exposed places, have shorter stems and more leathery leaves than those which grow upon trees where they receive partial shade from the tree's foliage. It has also been further observed, that at the lower limits of their vertical range, they grow high up in the forks of the trees, gradually affecting lower positions as the elevation increases, so that at the higher limits they grow upon the trunks and branches of trees within the reach of a man standing on the ground. Moreover, plants of *C. labiata* Trianae that were observed growing upon the branches of trees fully exposed to the sun and air, or nearly so, have plump stems and leaves and flower freely, while those growing in the shade have elongated stems and leaves of diminished size and rarely flower.† In a wild state scarcely any soil is found at their roots, only a few leaves which have fallen among the stems, and the roots are rarely covered with moss.

The South Brazilian Cattleya and Laelia region may be roughly described as a broad belt of variable width parallel with the coast line extending from Bahia to Porto Alegre; it consists of high undulated table lands at an average elevation of more than 2,000 feet, intersected by chains of mountains of considerable altitude, and by numerous valleys through which flow large rivers fed by innumerable

* For further notes on the climate of Mexico, see Laelia.

† Herr Roezl in Godefroy's Orchidophile April (1888), p. 572.



tributary streams, along whose banks the trees are clothed with a profusion of epiphytes. This region is one of the most luxuriant tracts of vegetation known, for it not only lies within and extends a little beyond the southern tropic, but its coast-line is almost perpendicular to the direction of the south-east trade wind, by which an enormous amount of the vapour raised from the South Atlantic Ocean is being constantly drifted over it. So great is the quantity of moisture directed against the Serra do Mar, a high range of mountains stretching along almost the entire coast-line of the region, that the vegetation in many places is never interrupted. Nevertheless, with these exceptions, there is throughout the region an alternation of wet and dry seasons—thus at Rio de Janeiro, which is situated near the southern tropic, the climate from May to September is dry and cool, but frequent showers fall, although they are not to be compared with the continuous rains of the wet season, which sets in in October and lasts with but little interruption till the following April.* In other parts of the region, the periodicity and duration of the seasons vary a little with the latitude of the locality.

Throughout the three regions sketched above, atmospheric currents are constantly passing, owing to the action of the trade winds.†

Cultural Note.—Notwithstanding the enormous extent of territory over which the Cattleyas and Lælias are spread, there is a similarity in the climatic conditions under which they grow and are perpetuated in their native countries, however distant from each other, that renders it quite a feasible task, on the part of the horticulturist, to cultivate all, or by far the great majority of them in one glass structure.‡ A glass structure appropriated to the cultivation of these orchids is usually called the Cattleya house, which is now frequently a spacious and airy building of greatly improved construction as regards ventilation,

* Gardner's Travels in Brazil (1836-41), p. 12.

† The position of some of the names on the maps illustrating the geographical distribution of Cattleya and Lælia must be accepted as approximately correct only. In such cases, the true habitat of the species has either been too vaguely recorded, or it has been purposely withheld for trade objects, to which the interests of science are, unfortunately, often regarded as altogether subordinate.

‡ Exceptions are generally made in cases of the following species:—*Cattleya citrina*, *Lælia albida*, *L. anceps*, and varieties, *L. autumnalis*, *L. cinnabarina*, *L. flava*, *L. majalis*, *L. rubescens*. They are all from a higher altitude and require greater extremes of temperature, but a lower mean than is usually maintained in the Cattleya house. They also demand a special treatment as regards light, ventilation, and watering. (See *Lælia infra*). On the other hand, *C. Aclandiae*, *C. superba*, *C. Eldorado*, *C. guttata Prinsii* coming from lower altitudes, require, at least, during the growing season, a closer atmosphere with a somewhat higher average temperature.

etc., etc., in which many of the difficulties formerly experienced in cultivating successfully many Cattleyas are practically obviated. In such a house, Cattleyas and Lælias are cultivated in a temperature ranging from 13°—20° C. (55°—70° F.) according to the season of the year, with such increments by sun-heat as circumstances admit.* The heating apparatus of the Cattleya house must, therefore, be of sufficient power to maintain this temperature; the house must be provided with ample means of ventilation both above and below, and with shading appliances that admit of being easily and readily manipulated. Provided with such a house, the usual routine of Cattleya and Lælia culture will be readily understood.

The *compost* used for these orchids consists of fibrous peat and sphagnum moss in the proportion of two-thirds of the former and one-third of the latter, well mixed together. The drainage must be as free as possible, and where pots are used—and we recommend these in all cases except for certain species for which a different arrangement is advisable, and which is noted under the description of each—the material, consisting of broken clean crocks, should fill the pots to at least two-thirds of their depth, secured at top by a layer of fresh sphagnum. Pots proportionate to the size of the plants should be selected, that is to say, pots just large enough to allow the base of the plant to be pressed firmly on the compost, and to admit of the larger roots being pressed in and among it. Over-potting, with the object of stimulating the plants into more active growth, is one of the greatest fallacies that can be entertained in Orchid culture, and which cannot be too strongly cautioned against. The plants on being potted, should be elevated above the rim, to allow the new roots, as they are produced, to push forward without impediment, also to allow water to pass through the potting material more freely, and to prevent its becoming stagnant, thence causing the pots to get water-logged, which would prove fatal to the plants. If the plants are large and heavy, they should be secured by means of suitable sticks inserted in the pots, to which the plants may be tied; they then become firmly established in a shorter time than they would do if subjected to any kind of oscillation; plants that are unstable in their pots will certainly suffer sooner or later. The best time to re-pot Cattleyas and Lælias is when they begin to emit new roots, and as all the species do not emit their new roots at the same period of the year, the potting season will vary accordingly; it is only by watching the first appearance of the young roots, that the cultivator can know when to re-pot the plants. On account of the disturbance of the roots, the re-potting of these orchids is an operation requiring great care.

* Thus, in December, January, and February the day temperature by fire-heat should be about 15° C. (60° F.), and the night 12°—13° C. (52°—55° F.). In March, April, October, and November 18°—20° C. (65°—70° F.) by day, and about 15° C. (60° F.) by night. During the remaining months, the day temperature should not be allowed to fall much below 20° C. (70° F.) nor the night temperature much below 18° C. (65° F.).

During the growing season *water* should be given once or twice a week, or so often as to prevent the compost from becoming dry; a good watering at moderate intervals seems to be preferable to frequent saturation. If the plants are on blocks, more frequent waterings are necessary; in these cases the blocks with the roots of the plants should be held under water for a few seconds every time. When growth is completed, the waterings should be diminished gradually, till only just sufficient is given to prevent the stems and leaves from shrivelling. A certain amount of moisture must at all times be maintained in the atmosphere of the house, the amount or, as we should say, the hygrometric conditions being regulated according to the season; this is effected by "damping down," that is to say, by watering through the rose of an ordinary watering-pot or syringe, the pathways and side-walls of the house, beneath the stages, and any surface upon which water may be thrown, and from which it will evaporate freely—the greater the surface watered, the greater, of course, is the quantity of water evaporated. During the winter months, two or three times a week will be found often enough to damp the floor of the house; as the season advances, the damping must be performed more frequently until the summer months, when the greater part of the plants are in active growth, and when the maximum of atmospheric moisture must be maintained. In very hot weather, damping the house three times a day will not be found too often.

The *ventilation* is, of course, influenced by and regulated according to the temperature of the external air. It should at all times be as free as practicable, consistent with the preservation of the plants in perfect health. The bottom ventilators should be slightly opened when the external temperature is 8° C. (45° F.), and wide open when it is 13° C. (55° F.); the top ventilators may be opened when the external temperature is 15° C. (60° F.), and the side lights only when the weather is decidedly hot. Care should be taken to avoid sudden and violent draughts, and not to ventilate too freely immediately after the house has been "damped down," as, then, the action of one counteracts the effects of the other.

The *shading*, which should be of thin material to admit of the transmission of a considerable amount of sun-heat, as well as of as much light as possible,* should be used chiefly during the growing period of the plants, to prevent the young shoots from being injured by the direct rays of the sun. When the leaves of the plants feel warm to the hand, more air should be admitted, and if the sky remains clear and the sun is bright over-head, the blinds should be lowered, and remain down till the sun's power on the house has diminished sufficiently to allow his rays to fall again on it without harm. Sudden rises in temperature, such as would be caused by the

* Brittain's Netting, No. 6, is a very suitable shading material for a Cattleya-house.

simultaneous drawing up of blinds and the closing of ventilators, should be carefully avoided; and conversely, sudden falls in the temperature of the house, brought about by any manipulation of the shading, ventilating, or heating apparatus that would tend to produce it, should also be carefully guarded against.

The treatment of newly-imported plants should, for a time, be a slight modification of the foregoing, that is to say, the watering, ventilation, &c., should be more gradual, as regards quantity and extent, till the plants are established.

The plants are subject to many insect pests, from which they should at all times be kept as free as possible. It is one of the most severe taxes on the patience of the cultivator, to be constantly on the watch for the appearance of these and to adopt remedies for their destruction.

The cultural routine detailed above is that which has been generally recommended and practised for some years past by the most successful cultivators of Cattleyas and Lælias in this country. It is founded upon empiricisms derived from experimental practice induced by the frequent failures that occurred under a former mode of treatment by which these orchids were subjected to a high temperature in a close stifling atmosphere, under a mistaken conception of the conditions under which they flourish in their native countries.

Great successes, it must be admitted, have been achieved under the cultural treatment we have formulated above, and specimens of floral excellence have been produced that were unknown, if not impossible, under the former *régime*. Still there has been but too frequently a *something* left to be desired; many instances are remembered of plants of which great expectations were entertained, that could not be induced to flower at all, and of others that did not flower in their season with unvarying perfection; it has happened, too, that many choice and valuable varieties have been induced to flower only with great difficulty, and their flowering in season could not always be depended upon; moreover, the plants seem to have acquired a certain delicacy in constitution never seen in newly imported ones. Taking into account the impracticability of exactly, or even approximately imitating in a glass structure, the climatic and other conditions of a distant land in a different latitude from our own, the drawbacks here noted may not be inseparable from the altered circumstances in which the plants are placed, or they may have arisen from some defect in their cultural treatment that has yet to be remedied. Be this as it may, the more accurate knowledge of the native habitats of Cattleyas and Lælias acquired in recent times, has induced earnest cultivators to make further experiments and trials to improve their culture. It is pointed out that the cultural treatment of these plants as generally practised, differs in some important particulars from that which they receive from Nature's

own hand; for example—the temperature is limited to an average mean from which it does not deviate throughout the year but a few degrees; the influence of the atmosphere, even when the external temperature is sufficiently high to allow the exposure of the plants, is greatly diminished by a restricted ventilation; a large proportion of direct sun-light is excluded, by the action of which alone the tissues of the plants can be perfectly developed; the drenchings which the plants receive overhead from the tropical rains in their native countries, are unknown to them here. All this is perfectly true, but it is not the *whole* truth as we shall presently show.

Among the experienced orchid-growers who have made the most decided innovation in the cultivation of Cattleyas and Lælias as generally practised, are Messrs. Backhouse, of York, who, with the object of bringing, as they believe, their cultural treatment more in conformity with Nature's own procedure, initiated, a few years ago, a system of cultivation of which the most prominent feature consists in growing the plants in a large, airy house unshaded; they are thus exposed to the full action of the sun at all seasons, and to as much ventilation as the external temperature of the atmosphere will safely admit. "One of the consequences that naturally follows the sun's unobstructed rays coming directly on the plants is, that they require much more water, not alone on account of the drying influence direct sunlight has on the material in which their roots are placed, but equally so by the more vigour imparted to the plants which enables them to take up more without any danger of the young growths or roots decaying through its presence. Thousands of Cattleyas and other occupants of these unshaded houses in Messrs. Backhouse's Nurseries are watered overhead from the spout of an ordinary watering-pot, it being applied to them with as little stint, as if the whole had been a bed of Cabbages."

"The result obtained by this treatment is, that the plants acquire a robustness in habit and firmness in texture rarely seen out of their native country; the scapes and peduncles bear a larger number of flowers, and these again acquire a coloration whose splendour is rarely equalled under the shading system."*

Admitting the general facts stated in the article in the *Gardeners' Chronicle* from which the above extracts have been taken (for by the courtesy of Messrs. Backhouse, we have had the privilege of inspecting their houses in which these orchids are culturally treated in the manner above described), we are, nevertheless, unable to recommend the adoption of their method by amateurs. It is, in fact, a re-action from one extreme to another, from a former system in which heavy shading was one of the prominent features to no shading at all. Although apparently in accord with Nature's own treatment of the

* Gard. Chron. XX. (1883), p. 70.

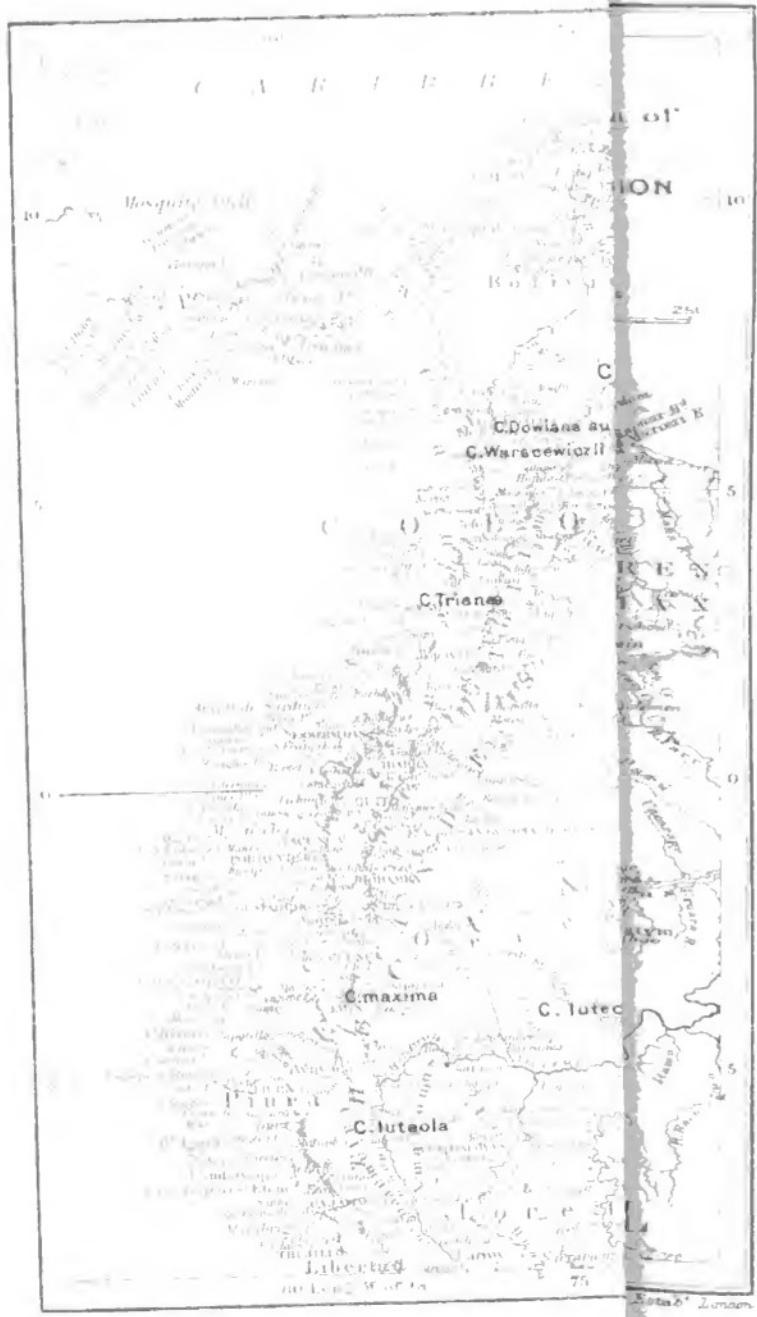
plants in their native haunts, this seeming agreement is far from real. But very little reflection is necessary to show, that under this treatment, great and important differences in the circumstances under which the plants are placed in the confined glass-houses in this country, compared with their free exposure in their own habitat, are altogether ignored. One instance will suffice to show this:—the plants by being brought from their native land to the glass houses in Great Britain are transferred from proximity to the equator to a comparatively high latitude. In their own habitat, the sun, when it does shine upon the plants, darts his rays either perpendicularly upon, or at most, inclined at a very small angle. In England, in the latitude of London, the smallest angle at which the sun's rays can fall upon a given spot is about 28° , and this only for a few days at Midsummer, the angle increasing daily from that time till mid-winter, when it reaches 75° ; hence full exposure of the plants subjects them, between Midsummer and Christmas, to enormous extremes as regards solar light and heat which they never experienced in their native country, and which the greater length of the days at Midsummer by no means tends to counterbalance, and these extremes the plants are unable to support for an unlimited succession of years.

It is with some reluctance that we have made this digression, but in the interests of amateurs, we have felt it incumbent on us to bring the subject before them as succinctly as possible, and consistent with clearness, especially as it has received prominent notice in the horticultural press. We by no means deprecate experiments with the object of effecting improvements in orchid-culture, but we advise caution and a thorough consideration of the whole of the known facts before proceeding to make them. We are, however, glad to note one good result likely to accrue from Messrs. Backhouse's experiments, and that is, the more successful cultivation of a group of orchids that have hitherto been considered refractory; this group includes the Mexican Lælias, which, under their treatment, grow with a vigour and flower with a regularity but hitherto rarely seen. But the Lælias of Mexico live under climatic conditions that are different from those under which the Cattleyas of the Colombia-Guiana and South Brazilian regions grow and flourish, and hence their adaptation to the treatment can, at least in part, be accounted for.

SYNOPSIS OF SPECIES AND VARIETIES.

THE LABIATA GROUP.

Cattleya labiata, in its scientific import, is the collective name for a group of Cattleyas remarkable for the large size and extraordinary beauty of their flowers. The group includes a number of



distinct forms, known in cultivation under various names, which pass as specific, such as *Dowiana*, *Mossiae*, *Trianae*, *Warneri*, &c., some of which have been hesitatingly described as species by botanists. When, however, all these so-called species are carefully studied and compared one with the other, and with the typical species first introduced, which is still in cultivation, and which, for the sake of clearness, we will call *C. labiata vera*, it is found impossible to detect characters in the structure of their flowers sufficiently constant, or of sufficient scientific value, to separate them specifically, either from each other or from *C. labiata vera*. In their vegetative organs, too, rhizome, stems, and leaves, they present a uniformity that renders it difficult to distinguish them from each other when out of flower, although, by long practice, cultivators become sufficiently familiar with them to be able to identify some of the members of the group by some peculiarities in the stems and leaves, but which cannot well be described.*

Having regard to the horticultural importance of the group, we have both in the text and on the map illustrating their geographical distribution, referred to them rather as sub-species, omitting the specific name for the purpose of avoiding a cumbrous nomenclature.

C. labiata, as a species, in the comprehensive sense implied above, is spread over an immense geographical area, of which the limits can nowhere be accurately defined in the present defective state of our knowledge respecting the actual distribution of all the forms that are, or may hereafter be brought under it. The typical *C. labiata* is Brazilian, and was originally gathered in a locality within a few miles of Rio de Janeiro; the form with yellow sepals and petals, called *C. Dowiana*, is a native of Costa Rica, the only one at present known north of the isthmus; by far the greater number of the sub-species, as we will conventionally call the most distinct forms, occur in the Colombia-Guiana region. As regards the habitats of the sub-species—it is a remarkable fact that they are quite local—each is restricted to certain limits, beyond which it may be searched for in vain; only one instance is known in which one has been found to spread into the range of, or to

* Generally, the leaves of *Warscewiczii* are longer, *Warneri* broader and more spreading, *Percivaliana* narrower, and *Eldorado* thicker than those of the other forms; the stems of *Eldorado* are shorter, *Luddemanniana* smoother and thinner, and *Warscewiczii* longer, but deviations from all these are common. The dimensions of the stems and leaves are not only influenced by the station of the plant in its native land, but evidently by cultivation also.

be intermingled with another.* Throughout the explored portion of the vast region over which *C. labiata* is spread, particularly in the Colombia-Guiana region, the sub-species occur in districts, in one or two instances of immense extent, in others of very limited dimensions, scattered irregularly over the region, and not infrequently at very great distances from each other. Whatever may have been the causes which brought about this local isolation, it appears certain that its tendency has been to preserve and perpetuate each as a tolerably well defined form not easily confounded with any other; but, in fact, the chief distinction between the sub-species consists in the coloration of their flowers, which, while surprisingly varied as regards the shade of colour, assumes a definiteness in the labellum sufficient to determine their identity.

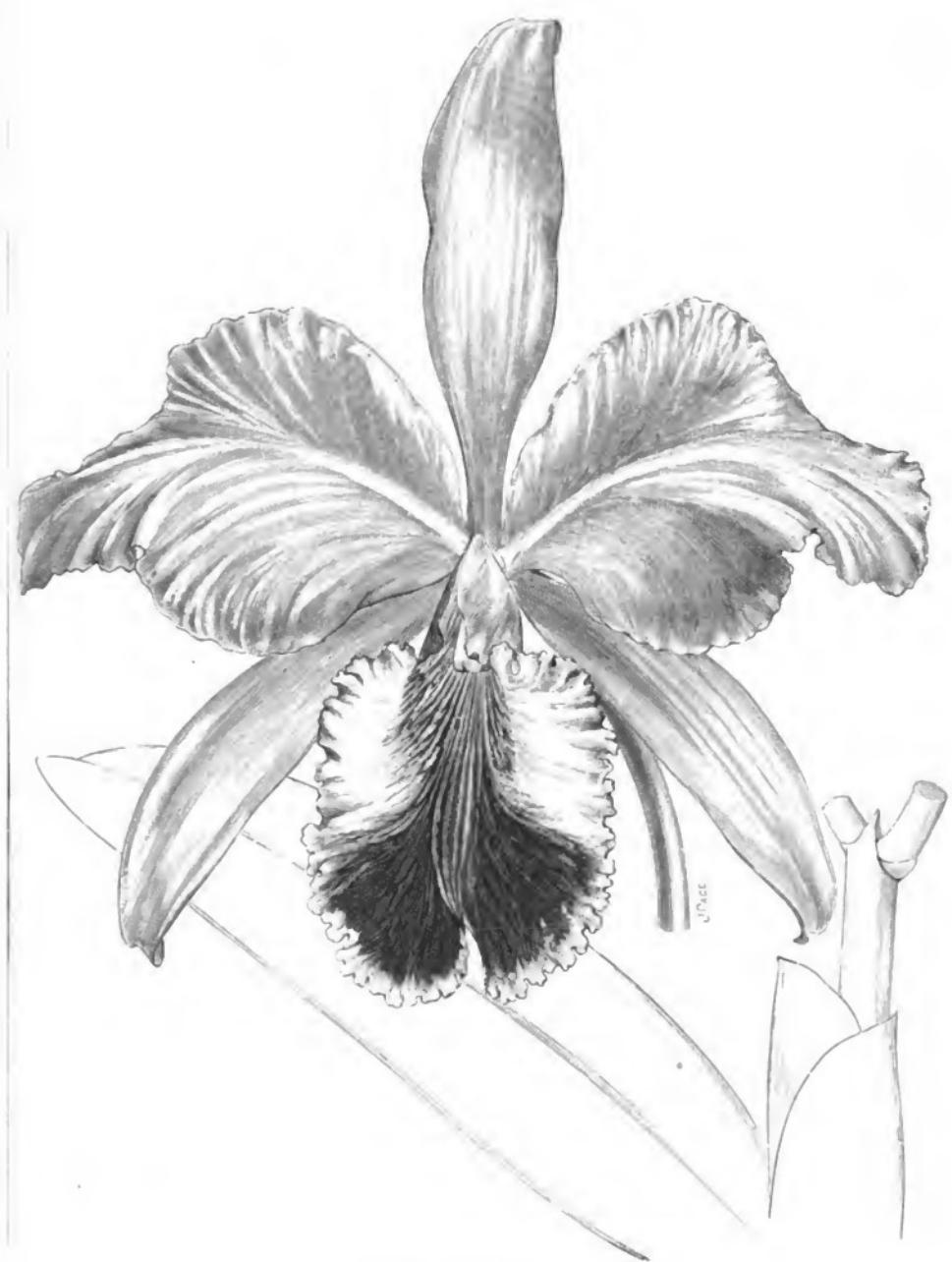
Another distinction, trifling in a scientific point of view, but a very important one in its horticultural bearing, is seen in the different seasons in which the sub-species produce their flowers. There is, indeed, scarcely any period of the year in which one or more of them are not in bloom, and when a number of plants are grouped together, a more beautiful floral sight can scarcely be imagined. All exhale a pleasant fragrance, which, although faint in the individual flower, has a powerful but very grateful effect when emitted from a large number of flowers in the same house.

In connection with the different flowering seasons of the sub-species, a further distinction may be observed in their vegetation, thus—while *Mossiae*, *Mendelii*, *Percivaliana*, and *Trianae* flower from the stems formed in the preceding season, and after the period of rest, *Douciana*, *Gaskelliana*, *Eldorado*, *Luddemanniana*, *Warscewiczii*, and *Warneri* flower from stems formed during the current season, and without any perceptible interval of rest; *labiata vera* flowers from the stems formed during the current season, but the peduncle does not emerge from the sheath till about two months after the stems and its leaf have completed their growth.

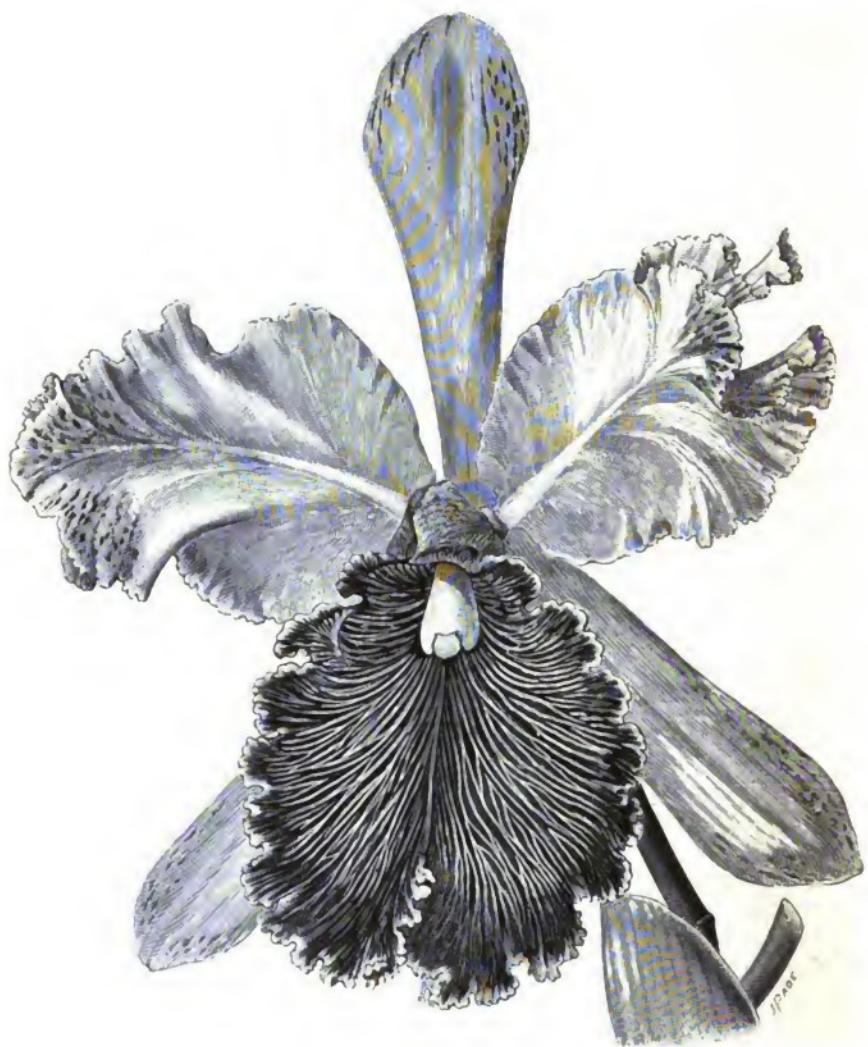
Cattleya labiata (vera).

Rhizome as thick as the little finger. Stems clavate, 5—10 or more inches long, slightly compressed, clothed with a greenish membranous closely adherent sheath, bare and furrowed when old, monophyllous. Leaves oblong, obtuse, 6—10 inches long, very coriaceous and persistent

* The exception is that of *C. Warscewiczii (Gigas)* and *C. Douciana aurea*, which have been found growing together in the neighbourhood of Frontino, a small town on the central Cordillera of New Granada, not far from Medellin. One supposed natural hybrid between these two forms has appeared among importations of one of them; it is called *C. Hardyana*, see infra.



Cattleya labiata vera.



Cattleya labiata Dowiana.

several years. Peduncle 2—5 flowered, issuing from a compressed double sheath* that is greenish brown, tinged with purple in the original type, pale green in most of the varieties. Flowers open, 5—6 inches in diameter; sepals lanceolate, smooth, bright satiny rose, faintly toned with mauve; petals ovate, wavy, nearly three times as broad as the sepals and the same colour; lip ovate-oblong, obscurely three-lobed, the side lobes with entire margin, convolute into a tube, and of the same colour externally as the sepals and petals; the anterior lobe spreading, deeply emarginate, with a crisped or frilled margin, rich magenta-purple, bordered with rosy-lilac; below is a pale yellow blotch streaked and veined with reddish purple. Column club-shaped, semiterete above, grooved beneath, and expanded into two wing-like margins.

Cattleya labiata, Lindl. Collect. Bot. t. 33 (1821—24). Id. Gen. et Sp. Orch. p. 166 (1831). Bot. Reg. t. 1859. Bot. Mag. t. 3998. Paxt. Mag. Bot. IV. p. 121. Hook. Cen. Orch. t. 28. Paxt. Pl. Gard. t. 24. Regel's Gartenfl. t. 146 (1856). Belg. hort. 1860, p. 193. Van Houtte's Fl. des. Serres t. (1895—96). Jennings' Orch. t. 45. Williams' Orch. Alb. II. t. 88. C. Lemoniana, Lindl. Bot. Reg. (1846), t. 35. Epidendrum labiatum, Rchb. Xen. Orch. II. p. 29 (1862).

Sub-vars., distinguished by colour only; *Pescatore's*, flowers of a deeper colour than those of the original *C. labiata*; *pallida* (Williams' *Orch. Alb.* III. t. 121), flowers paler.

C. labiata was introduced in 1818 by Mr. William Swainson from the Organ mountains situate about sixty miles north of Rio de Janeiro in Brazil, but where it is believed to have been exterminated many years ago, a belief unfortunately strengthened by the fact that no plants of it have been known to have been imported for upwards of forty years, although it has been diligently sought for by collectors sent out by English and other horticultural firms. Dr. Gardner during his travels in Brazil, 1836—41, visited the Organ mountains twice, but makes no mention of having met with it there, nor did our own collector, William Lobb, who explored the mountains in 1840. Gardner, however, saw it on the face of the Gavea, or Topsail mountain, about fifteen miles distant from Rio, at an elevation of several hundred feet; but it is now known to have long since disappeared from that locality.† It has, therefore, become quite rare, and notwithstanding its long sojourn in

* The double sheath is one of the characters by which the original *Cattleya labiata* is sometimes recognised; it is not, however, peculiar to the typical form, it occurs frequently in *Warneri*, and sometimes in *Mendelii*.

† Gardner also states that he detected *C. labiata* at Sapucaya on the river Parahybo, which separates the provinces of Minas Geraes and Rio de Janeiro (p. 538), but the form he met with here is, with a very high degree of probability, believed to be the variety *Warneri*.

this country, propagation by division, the only available method, has been no more than sufficient to secure a limited number of plants.

The normal flowering season of *C. labiata vera* is in the months of October and November. The specific name *labiata* is non-classical, and signifies "furnished with a lip," in reference to the prominence of that organ in this species.

var.—Dowiana.

Sepals and petals nankeen-yellow; the anterior lobe of the lip broader and more spreading, in texture resembling velvet, and of the richest crimson-purple, "uniformly streaked with golden threads radiating from its centre, where they meet three other golden lines passing longitudinally from the base to the apex."

C. labiata Dowiana, supra. *C. Dowiana*, Batem. in Gard. Chron. (1866), p. 922. *Bot. Mag.* t. 5618. Van Houtte's *Fl. des Serres* t. (1709-10). *Illus. hort.* t. 525. Warner's *Sel. Orch.* II. t. 27. *Belg. hort.* (1869), t. 193. Jennings' *Orch.* t. 33. De Puydt *Les Orch.* t. 7. *The Garden XII.* (1877), t. 99. *C. Lawrenceana Warsc.* fide. Rchb. in *Gard. Chron.* XIX. (1883), p. 243.

Sub-var.—aurea, the yellow markings on the lip more copious and irregularly distributed over the surface.

C. Dowiana aurea, Williams' *Orch. Alb.* II. t. 84. Sander's *Reichenbachia I.* t. 5. *C. aurea*, *Illus. hort.* (1881), t. 80.

Originally discovered by Warscewicz in Costa Rica about the year 1850. He sent plants to Messrs. Low and Co., at Clapton, but arriving in bad condition they eventually died. The dried specimens that accompanied the living plants were sent by Mr. Low to Professor Reichenbach, but the parcel containing them failed to reach their destination; hence it happened that for some years afterwards, doubts were entertained of the existence of so superb a Cattleya as that which the letters of the traveller described, and in which he expressed a wish that it should be named in compliment to Mrs. Lawrence, of Ealing, at that time one of the most liberal patronesses of orchid culture and orchid collectors in this country, a request of which Mr. Bateman could not have been aware when describing it many years later for the *Botanical Magazine*, dedicating it by request of Mr. G. Ure Skinner to Captain Dow, of the American Packet Service. It was re-discovered in 1865 by Mr. Arce, a native naturalist, while engaged in collecting natural history objects in Costa Rica for Mr. G. Ure Skinner. He sent plants of *C. Dowiana* to Mr. Skinner in England through Captain Dow, which were acquired by us, and one of them flowered for the first time

in our Chelsea establishment in the autumn of 1865. The habitat of this Cattleya appears to be restricted to a small area on the slopes of the great central mountain range facing the Pacific Ocean, and where it is said to exist in very limited numbers.

The variety *aurea* was discovered by Gustav Wallis, in 1868, near Frontino in the state of Antioquia, while collecting plants in New Granada for M. Linden, and four years later by Butler while on a mission to the same region for Messrs. Backhouse, of York.* The late M. Roezl† placed its habitat in the state of Antioquia, near the river Cauca at a considerable distance above its confluence with the Magdalena, a locality upwards of six hundred miles distant from the native home, in Costa Rica, of the typical *C. Dowiana*.

var.—Eldorado.

Flowers smaller than those of *C. labiata vera*, the lip more tubular with the anterior lobe less spreading; sepals and petals pale rosy lilac passing to white; lip with a rich orange-yellow, sometimes golden yellow disc surrounded by a broad white zone, which on the anterior side is either bordered with purple or blotched with purple on a pale rose ground fading off laterally to pale rosy lilac; the convolute portion of the lip is externally, sometimes white, sometimes coloured like the sepals and petals.

C. labiata Eldorado, supra. *C. Eldorado*, Hort. Linden, 1869. Van Houtte's *Fl. des Serres*, t. 1826 (1869—70). De Puydt, *Les Orch.* t. 8.

Sub-vars.—*crocata* (Gard. Chron. XXVI. (1886), p. 360), segments white or pale rose, disc of lip deep orange, prolonged in a broad line to the base; *ornata* (Gard. Chron. XX. (1883), p. 526), segments rose-purple, the petals with a deeper rose-purple blotch at the apex; *splendens* (*Illus. hort.* 1870, t. 7), segments of a deeper colour, especially the anterior border of the lip, than in the usual type; *virginalis* (*Illus. hort.* 1876, t. 257); *C. Wallisii*, Hort. Linden, *fide* Rehb. Gard. Chron. XVII. (1882), p. 557), segments white with the orange-yellow disc of lip reduced in size.

First imported by M. Linden about the year 1866 from the region of the Rio Negro in Brazil, and one of the first plants to flower in Europe was exhibited by him at Paris, in 1867, under the name of *C. Eldorado*. This Cattleya continued scarce for some years, till an importation from the same region in 1876 by M. Binot, a French collector of Orchids in Brazil, caused it to become

* *Gardening World* I. p. 296.

† *Godefroy's Orchidophile*, 1883, p. 608.

more generally distributed among the Orchid collections both in this country and on the Continent. Its habitat is near the Rio Negro, not far from its confluence with the Amazon, a significant fact in the geographical distribution of the Cattleyas of the *labiata* group, and which cultivators will do well to bear in mind, as that part of the region where *C. Eldorado* occurs, lies lower, its climate is hotter, and the alternation of wet and dry seasons more decided than in the other *C. labiata* districts.*

C. Eldorado is not only distinguished from the other Cattleyas of the group by the characters described above, but also by its more rounded and smooth stems, and by its more rigid, leathery, erect leaves; it usually flowers in the months of July and August. The name El Dorado is literally "the golden land"; it was given by the Spaniards in the sixteenth century to an imaginary region in the interior of South America, lying between the Orinoco and the Amazon.

var.—*Gaskelliana*.

Sepals and petals usually pale amethyst-purple suffused with white, but sometimes deeper and uniform, and sometimes with a white central band; convolute lobes of lip coloured like the sepals and petals but frequently paler; anterior lobe with a pale rosy mauve crisped margin, and an orange or tawny yellow, striated disc, on each side of which is a large white blotch, and in front of it a mottled blotch of rich amethyst-purple.

C. labiata Gaskelliana, supra. *C. Gaskelliana*, Hort. Sander, Gard. Chron. XIX. (1883), p. 310.

In the Spring of 1883, a new Cattleya sold at Stevens' Rooms under the name of *C. Gaskelliana*, and which had been introduced by Messrs. Sander and Co., of St. Albans, flowered for the first time in some of the orchid-houses in this country. Without any intimation of its habitat, although since known to be of Venezuelan origin, and without even an authoritative name, it was at first regarded with some misgiving, but when in the following year flowers were produced by established plants, it proved to be a beautiful addition to the *labiata* group, referable to none of the previously known forms, but apparently intermediate between *C.*

* Thus, at Manaos, at the junction of the Amazon and Rio Negro, "the dry season is very hot, the thermometer reaching 35° C. (95° F.) in the shade at two o'clock every afternoon, and not sinking below 24° C. (75° F.) during the night; there is scarcely any rain during the months of July and August."—Wallace's *Travels on the Amazon and Rio Negro*, p. 189.

Mossiae and *C. Luddemani*. Its normal flowering season is from about the middle of June to August, thus filling up the interval in the Cattleya season between the flowering of *C. Warneri* and *C. Ellorada*, and having the late sub-varieties of *C. Warscewiczii* (*Gigas*) for its companions. It is dedicated to Mr. Holbrook Gaskell, of Woolton, near Liverpool, long known as an assiduous cultivator of Orchids, and the possessor of one of the finest collections in the north of England. Like the New Granadian forms of *C. labiata*, the flowers of *C. Gaskelliana* are very variable in colour, that of the sepals and petals ranging from amethyst-purple of a medium shade to pure white, while the tints of the disc and anterior lobe of the lip are almost as varied as in *C. Mossiae* or *C. Trianæ*; the sub-variety, known as Thomson's, is peculiar, the lateral sepals have a broad orange-yellow band down the middle, and are also heavily tinted with crimson-purple at their base.

var.—*Luddemani*.

Sepals and petals delicate purplish rose suffused with white, the petals nearly three times as broad as the sepals and gently undulated, chiefly in the distal half; convolute lobes of lip of the same colour externally as the sepals and petals; anterior lobe crisped, emarginate, fine amethyst-purple, with two pale yellow, sometimes white blotches at the entrance of the tube, between which are lines of amethyst-purple gently diverging from the base of the lip.

C. labiata Luddemani, Rehb. Gard. Chron. XIX. (1883), p. 243. *C. Luddemani*, Id. Xen. Orch. I. p. 29 (1854); *C. Dawsonii*, Warner's Sel. Orch. I. t. 16 (1862-65). *C. speciosissima Lowii*, Anderson in Gard. Chron. 1868, p. 404. *C. speciosissima Buchananiana*, Williams' Orch. Ab. VI. t. 261. *C. Bassettii*, Hort. *C. Mossiae autumnalis*, Hort.

Sub-vars.—*alba* (Godefroy's Orchidophile, 1886, p. 365), flowers large, pure white, with a pale yellow stain on the disc of the lip. *Baron Schroeder's* (Gard. Chron. XXV. (1886), p. 554), flowers white, with an orange-yellow stain on the lip that is prolonged to the base, and from which purple streaks branch obliquely on both sides, anterior lobe of lip streaked with mauve-purple; *brilliantissima** (Gardening World, I. (1885), p. 569-70), sepals and petals bright rose, the latter with an amethyst-purple feathered blotch near the apex; anterior lobe of lip maroon-purple, below which are two pale yellow blotches; *Regina* (Gard. Chron. XXI. (1884), p. 372), sepals and petals rosy purple, lip deep purple with two yellow blotches as in the type.

* We disclaim all responsibility for this barbarism; the flower is described and figured under this name at the place quoted above. This fine Cattleya is in Mr. Lee's collection at Downside.

The earliest authentic notice we find of this Cattleya, is in Reichenbach's *Xenia Orchidacea* quoted above. The author there describes a Cattleya flower produced by a plant which had been sent to the celebrated collection of M. Pescatore at St. Cloud, Paris, as *C. maxima*, but which, proving to be of a different species, received the name of *C. Luddemanniana*, in compliment to M. Pescatore's gardener, and long afterwards known as one of the most skilful cultivators of Orchids in France. This was the typical plant to which the *C. Luddemanniana* of continental gardens was subsequently referred, a form of *C. labiata* that has long been recognised as the *C. speciosissima* of British gardens.* Its first appearance in this country was, we believe, in the collection of the late Mr. Dawson, at Meadow Bank, near Glasgow, where it had been in cultivation several years prior to 1863, when it was figured in Warner's *Select Orchidaceous Plants* under the name of *C. Dawsonii*. This Cattleya was also represented at an early date in the collections of Mr. Rucker, at Wandsworth, of Mr. Bassett, at Clapham, and in a few others; but nothing appeared to be known of its origin till it was imported in quantity by Messrs. Low and Co., of Clapton, from Venezuela, where it occurs on the Cordillera, near the coast, at some distance eastward from Caracas, and at a lower elevation than *C. Mossiae*.

The flowering season of *C. Luddemanniana* in this country is in the months of September and October, when few other Cattleyas are in bloom, but it has frequently proved disappointing to the cultivator. Mr. Day, whose long experience in orchid culture enables him to speak with authority on the subject, informs us that in his former collection at Tottenham, it bloomed very irregularly and seldom; several plants did not flower at all, although they grew and kept healthy; it flowers on completion of young growth without resting; if it does not flower then, it does not flower till it makes another growth. In the more spacious and airy structures in which Cattleyas are now being cultivated, its flowering is more constant, and the difficulties formerly experienced with it are in course of being obviated.

* Some, on the contrary, affirm that the original *C. Luddemanniana* is a unique type, quite distinct from *C. speciosissima*, both in the form of the lip and in its coloration. See Reichenbach's notes on *C. speciosissima Regina*, loc. cit. supra, and Godefroy's *Orchidophile*, 1884, p. 103.

var.—**Mendelii.**

Sepals and petals white, frequently tinted with delicate pale rosy mauve, the colouring being more developed in the petals than in the sepals, the margin of the petals denticulate, much notched and waved on the distal half; convolute lobes of lip white or coloured like the other segments, the anterior lobe broad and spreading, with the margin much indented and crisped, rich crimson-purple, sharply separated from the yellow disc which is traversed by gently diverging reddish streaks.

C. labiata Mendelii, Sander's *Reichenbachia* I. t. 15 (1886). C. *Mendelii*, Hort. Backhouse, 1870.* *Fl. Mag.* n. s. t. 32 (1872). *The Garden*, XX. t. 304 (1881). Williams' *Orch. Alb.* I. t. 3 (grandiflora) (1882). *C. labiata bella*, Rchb. Gard. Chron. XVII. (1882), p. 700.

Sub-vars.—*bella* (Williams' *Orch. Alb.* V. t. 225),† sepals and petals delicately tinted with pale lilac, anterior lobe of lip rosy mauve traversed by pale lilac anastomosing lines; *Blunt's*, all the segments of the purest white except the usual yellow blotch on the lip, which in this form is considerably reduced in size; *James'* (Williams' *Orch. Alb.* IV. t. 178), sepals and petals rosy lilac, the latter with a small feathered purple blotch at their apex; anterior lobe of lip magenta-purple, the yellow of the disc deeper; *Mr. Lee's*, sepals and petals deeper in colour than in any form yet observed, the petals with an amethyst-purple blotch near their apex; *Mrs. Morgan's* (*C. Morganiae*, Williams' *Orch. Alb.* I. t. 6), sepals and petals white, the lip also white with a small purple blotch in front of the yellow disc which is striated with red.

First introduced in 1870 by Messrs. Low and Co., of Clapton, and shortly afterwards by Messrs. Backhouse, of York, who named it in compliment to the late Mr. Sam Mendel, of Manley Hall, near Manchester. It flowered for the first time in this country in June, in the following year, in the former collection of Mr. John Day, at Tottenham; its normal flowering season is, however, during the month of May. Its native home is on the slopes of the eastern Cordillera of New Granada, chiefly in the district lying between Pamplona and Bucaramanga, often growing on exposed precipices and on bare rocks. The abrupt contrast afforded by the rich purple of the anterior lobe of the lip with the yellow disc and its markings, and the delicately tinted or pure white sepals and petals, is a distinguishing characteristic of this *Cattleya*. The sub-variety *bella* is a distinct form in Mr. G. Hardy's collection, at Timperley, Cheshire. *Blunt's*, one of the most beautiful white *Cattleyas* known, and still very rare, was sent to Messrs. Low and Co. many years ago by the

* *Fide Williams' Orch. Gr. Man.* ed. VI. p. 190.

† The same as described by Reichenbach in the *Gardeners' Chronicle*, loc. cit. supra, under the name of *C. labiata bella*.

collector whose name it bears; it flowered for the first time in this country in Mr. Day's former collection, at Tottenham. *Mrs. Morgan's* differs chiefly from *Blunt's* in having a purple blotch on the lip. The variability of *C. Mendelii* is considerable, although not in so marked a degree as in *C. Trianae*; in addition to the sub-varieties described above, numerous fine forms are to be met with in many collections, some of which have received distinguishing names from their owners.

var.—Mossiae.

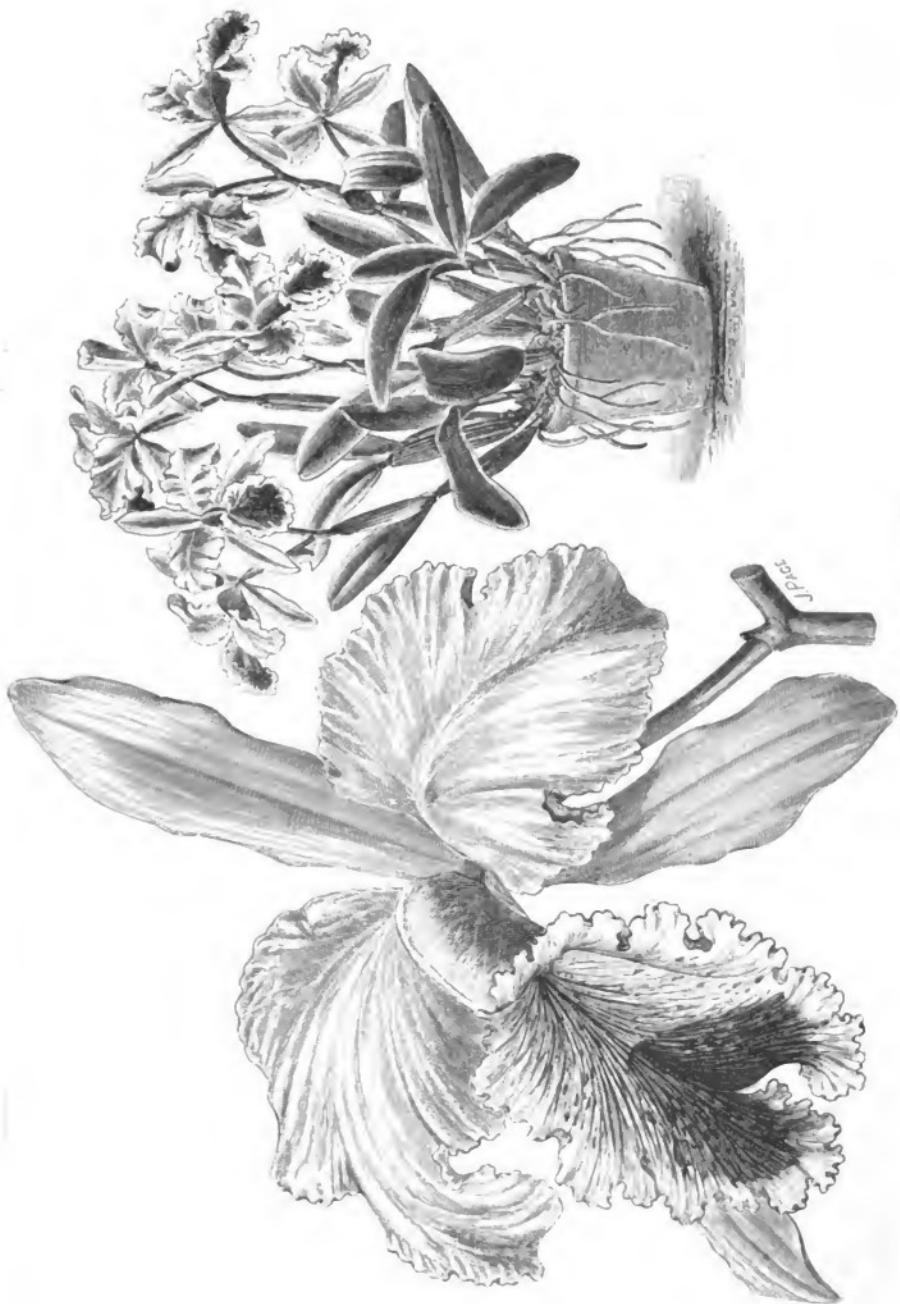
Flowers among the largest of the *labiata* group, not infrequently 6—8 or more inches in diameter; sepals and petals rosy lilac of a paler or deeper shade, sometimes white; lip larger than in the other forms except *Warscewiczii*, the open part broad with a crisped margin and with a deep cleft in the anterior side, extremely variable in colour, but nearly always with a yellow central band prolonged from the disc to the base, and with the convolute lobes obliquely striated with purple and pale lilac on the inner side, but generally externally of the same colour as the petals; anterior lobe rich velvety purple mottled and veined with lilac and bordered with a broad lilac band.

C. labiata Mossiae, Lindl. *Bot. Reg.* 1840, t. 58. Rehb. *Gard. Chron.* XXVI. (1886), p. 75. *C. Mossiae*, Hook. *Bot. Mag.* t. 3669 (1839). *Id. Cent. Orch.* t. 29 (1849). Warner's *Sel. Orch.* III. t. 16 (three vars.) Williams' *Orch. Alb.* VI. t. 246. *Id. VII.* t. 289. *C. labiata atropurpurea* Paxt. *Mag. Bot.* VII. (1844), p. 73. *C. labiata pietra*, Van Houtte's *Fl. des Serres*, VII. (1851), t. 660.

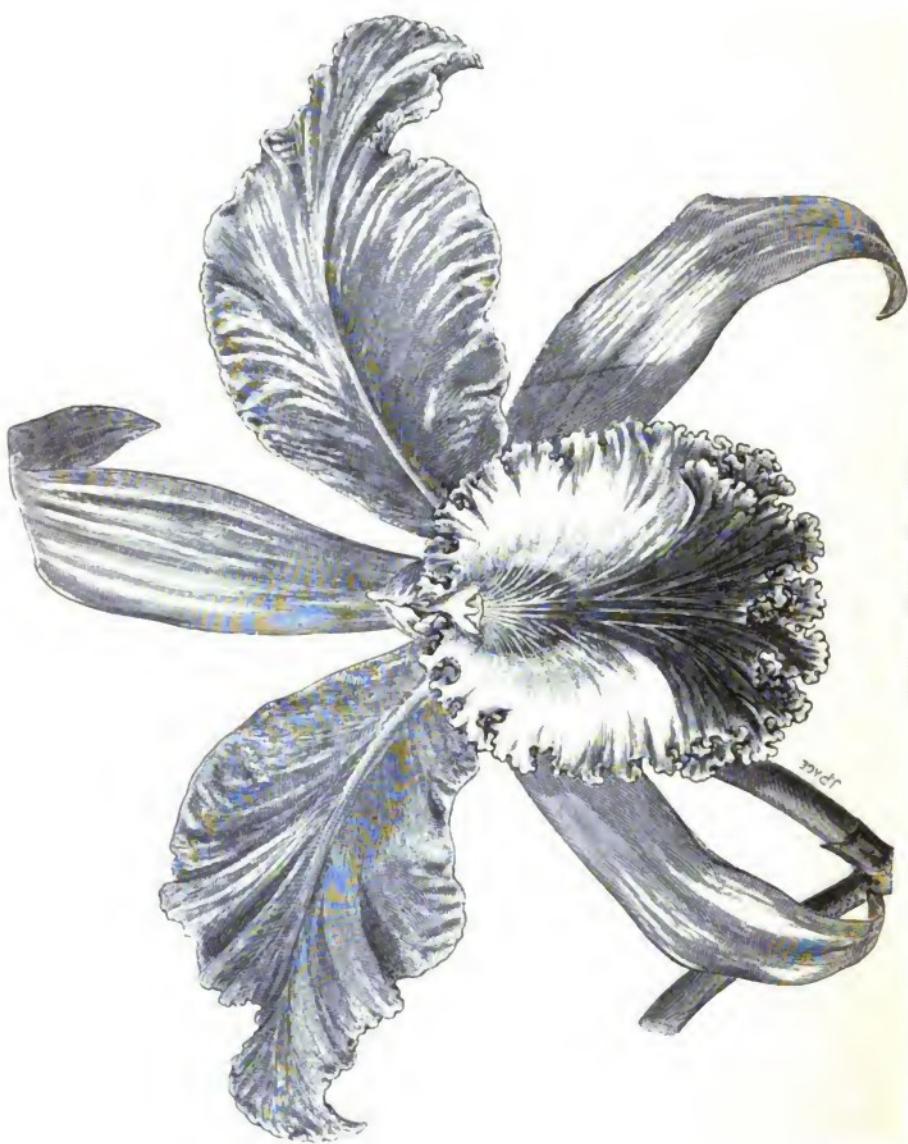
Sub-vars.—candida (*C. labiata candida*, Van Houtte's *Fl. des Serres*, VII. (1851), t. 661. Paxt. *Fl. Gard.* I. t. 24, syn. *alba* hort.) flowers white, the side lobes of the lip usually streaked with pale purple, the anterior lobe with a small purple blotch, that is sometimes striated as is also the yellow disc. *Mr. Hardy's* (Williams' *Orch. Alb.* III. t. 125) sepals and petals pale lilac-purple, much streaked and blotched in the direction of the veins with deep magenta-purple; convolute lobes of lip similarly coloured, the anterior lobe deep purple in the centre, with radiating streaks on either side. *Reinecke's* (*C. Reineckiana* Rehb. in Bonpl. IV. p. 327) flowers white, the yellow disc, and anterior lobe of the lip striated with deep purple. *Wagener's* (*C. Wageneri*, Rehb. *Xen. Orch.* I. p. 28, t. 13) flowers white, with the exception of the yellow disc of the lip, which, in this form, is much reduced.

This beautiful Cattleya appears to have been first introduced by Mr. George Green, of Liverpool, who received it from La Guayra, in Venezuela, in September, 1836, whence it was soon afterwards imported by Mr. Parker, of the Hornsey Nurseries, and others. It flowered for the first time in this country in the collection of Mrs. Moss, of Otterpool, near Liverpool, to whom it was dedicated, as

Cattleya labiata Mossiae, reduced.



Cattleya labiata Mendelii.



a species, by Sir W. J. Hooker.* Its native home is on that portion of the mountain range extending along the north of Venezuela, near the coast, that lies between Porto Cabello and Cape Codera, and where, judging from the large and frequent importations received in this country for many years past, it must be very abundant. It is one of the most variable of Cattleyas as regards the coloration of the labellum, so much so that scarcely any two plants produce flowers with lips alike, though all show the characteristic markings which chiefly distinguish this from every other Cattleya of the *labiata* group:—thus we find, in some sub-varieties, the rich purple of the anterior lobe predominates and gives its tone to nearly the whole visible surface of the lip; in others, it is the orange-yellow of the disc that spreads over the greater portion of the throat and anterior lobe; in others again, the rich purple colouring is reduced to a few divergent streaks, and its place is taken by a delicate rosy mauve not infrequently bordered with white. These forms are connected by others in which every imaginable shade of the predominant colours occur, passing from one into the other by gradations so gentle as to render futile any attempt to designate sub-varieties by particular names;† the four we have described above are the most distinct that have yet come under our cognisance. The flowering season of *C. Mossiae* is May and June.

var.—*Percivaliana*.

Flowers 4—5 inches in diameter; sepals and petals rosy lilac suffused with amethyst-purple, the petals usually more deeply coloured than the sepals; convolute lobes of lip of the same colour as the petals externally, but much toned with tawny yellow; on the inner side rose-purple striated with pale rose towards the margin; anterior lobe crimson-purple shaded with maroon, and having a pale lilac frilled margin; disc and base of side lobes rich tawny yellow passing to orange, streaked with red and purple; the area so coloured is, however, variable.

Cattleya labiata Percivaliana, Rchb. in *Gard. Chron.* XVII. (1882), p. 796.
Williams' *Orch. Alb.* III. t. 144. Sander's *Reichenbachia I.* t. 2. *Cattleya Percivaliana*, Hort.

* The Orchid collection at Otterpool is still maintained by her son, Sir Thomas Moss; it is thence one of the oldest in the country.

† In Williams' *Orchid Growers' Manual*, 6th ed. pp. 192—97, no less than thirty-four sub-varieties of *C. Mossiae* are described under separate names, many of them personal, others general, or of an indeterminate meaning as, *conspicua*, *elegans*, *grandis*, *magnifica*, *majestica*, *splendens*, *superba*, any one of which is as applicable to one good form as to another.

One of the latest additions to the group, it having been introduced in 1882 by Messrs. Sander and Co., of St. Albans, through their collector, Arnold, from the Cordillera of Venezuela, "at an altitude sometimes exceeding 4,000 feet; it invariably grows on rocks, not on trees, and in full exposure to the sun, generally in the vicinity of river courses, which, in the rainy season, afford abundant moisture to the plant." * It is a distinct as well as a beautiful Cattleya, and, in a horticultural sense, a most useful one also, flowering in mid-winter, after the flowers of the latest sub-varieties of the typical *C. labiata* have passed away, and simultaneously with, if not actually preceding, the blooming of the earliest *Trianæ* forms, thus, in a manner, filling up the interval between the flowering season of the two: this is the more remarkable, as its flowering season in its native home is said to be in October. Like the other members of the group, it is found to be variable in the colour of its flowers, some forms being paler than others, while others again are distinguished by a greater development of the rich tawny yellow of the lip, and a corresponding diminution of the maroon-purple of the anterior lobe. This fine Cattleya was dedicated to the late Mr. R. P. Percival, of Birkdale, Southport.

var.—*Trianæ*.

Sepals and petals variable in colour, the tints varying from a delicate rose shaded with amethyst purple, to pure white. Lip less patent than in most of the *labiata* forms, and usually less crisped at the anterior margin; the convolute lobes not infrequently coloured unlike the sepals and petals, the anterior lobe generally rich purplish-crimson, but often of a pale tint like the sepals and petals; disc broad, usually orange-yellow, often prolonged to the base of the lip in the form of a broad band, and sometimes striated with pale purple, lilac, or even white.

Cattleya labiata Trianæ, Duchartre Journ. Soc. Imp. d'Hort. 1860, p. 369.
fide Rchb. Xen. Orch. II., p. 30. *C. Trianæ*, Linden and Rchb. Bot. Zeit., XVIII., p. 74 (1860). Williams' Orch. Alb. I., t. 45. *The Garden* XXII. (1882), t. 346. *C. quadricolor*, Batem, Gard. Chron. 1864, p. 269. *Bot. Mag.*, t. 5504 (1865). *C. bogotensis*, Hort.

Sub-vars. — *alba*, flowers white with the usual yellow disc of the lip, in front of which is a small blotch varying in colour from rosy purple to a pale lilac; *Backhouse's*, sepals and petals pale rose-purple,

* *Reichenbachia* I., p. 5. We have been informed that the actual habitat of this Cattleya is in south-west Venezuela, on a branch of the eastern Cordillera, between San Cristobal and Merida.

the petals with an amethyst-purple stain near their apex, anterior lobe of lip magenta-purple, the yellow disc reduced to a narrow mid-band, on each side of which is a white blotch; *Baroness Schroeder's* (Gard. Chron. I., n. s. 3, (1887), p. 512), flowers of a uniform delicate blush suffused with white, disc of lip pale orange-yellow; *Baron Schroeder's*, flowers extra large, the petals broader than in the commoner forms, pale lilac, the side lobes of the lip tinted with amethyst-purple, anterior lobe deep purple; *choocoensis** (*C. choocoensis*, Illus. hort. 1873, t. 120), flowers the most fragrant of all the *Trianæ* forms, but never fully expanding owing to the petals being sessile or nearly so; sepals and petals white, sometimes tinted with pale lilac, convolute lobes of lip pale amethyst-purple, disc orange-yellow, in front of which is a small purple blotch; *delicata* (*Warszewiczii delicata*, Warner's *Sel. Orch.* I. t. 4; *Cattleya Rollissonii*, Moore, *Fl. Mag.* I. (1861), t. 8), sepals and petals white with a faint flush of pale amethyst-purple, lip deeper with a pale yellow disc; *Mr. Day's*, sepals and petals pale lilac, margin of side lobes and the whole of the anterior lobe of the richest magenta-purple; *Mr. Dodgeon's* (*Fl. Mag.* n. s. t. 64; Williams' *Orch. Alb.* VI. t. 249), sepals and petals white, convolute lobes of lip pale amethyst-purple, anterior lobe magenta-purple bordered with lilac, disc orange striated with pale yellow; *Mr. Lee's*, flowers the largest of the *Trianæ* forms yet introduced; sepals and petals delicate rosy mauve, anterior lobe of lip crimson-purple that extends also into the throat, almost obliterating the characteristic yellow disc; *Mrs. Lee's* (syn. *Emiliae*), sepals and petals of the purest white, side lobes of lip pale rose externally, anterior lobe bright rosy purple, the pale orange-yellow disc much reduced; *Osman's* (*Fl. Mag.* n. s. t. 361), sepals and petals delicate rosy mauve, convolute lobes of lip deeper, anterior lobe of the richest crimson-purple, paler at the margin, disc bright yellow; *Provost Russel's* (Williams' *Orch. Alb.* V. t. 219), sepals and petals pale rosy mauve, anterior lobe of lip, together with a large portion of the side lobes, deep crimson-purple; *virginalis*, pure white, with the exception of the pale yellow disc of the lip, which is much reduced in size.

Other forms are known as *formosa* (Williams' *Orch. Alb.* III. t. 108); *Hoole Hall* (*Id. VI.* t. 265); *Mons. Massange* (*Id. VI.* t. 242); *Mr. Coleman's* (*Fl. Mag.* n. s. t. 176); *Mr. Hardy's* (Gard. Chron. XI. (1879), p. 366); *splendidissima* (Williams' *Orch. Alb.* IV. t. 150); *Mr. Vanner's* (Gard. Chron. XXV. (1886), p. 331), etc., etc.

This popular *Cattleya* was first introduced into British gardens by the late Mr. Rucker, of West Hill, Wandsworth. That gentleman

* The late M. Roezl, than whom no traveller in New Granada knew the country better, took exception to this name. "Cette orchidée croît dans les Etats de Cauca en Colombie, et non pas dans le Choco comme son nom l'indique, et Dieu sait pour quelle raison la plante fut figurée dans *L'Illustration horticole* sous le nom de *choocoensis*, cela de *Trianæ* serait plus légitime."—*Godefroy's Orchidophile*, April, 1883, p. 571.

had received a single plant from a correspondent in New Granada, who had gathered it in the valley of the Upper Magdalena, and which flowered the year after its arrival; a flower was, in due course, submitted to Dr. Lindley, who considered it to be a new species, and called it *C. quadricolor* in allusion to the four colours that were observable in it.* Dr. Lindley, however, published no description at the time, nor was any published in England till many years afterwards (1864), when Mr. Bateman described it in the *Gardeners' Chronicle*, and in the following year it was figured in the *Botanical Magazine*. A few years previous to this, a Cattleya had been received from New Granada, by M. Linden, to which Professor Reichenbach had given the name of *Trianae*, in compliment to Dr. Triana, a botanist and citizen of Bogota, and of which he published a description in Mohl and Schlechtendal's *Botanische Zeitung* for 1860. As Lindley's *quadricolor* was subsequently found to be referable to Reichenbach's *Trianae*, the latter name, from priority of publication, must be retained.

Unlike most other members of the *labiata* group, this Cattleya is spread over a large area in New Granada, lying between the second and fifth parallels of north latitude, and occurring on all the three Cordilleras. It was collected for the Horticultural Society of London, in 1863, by Weir, in the neighbourhood of Bogota. M. Roezl describes in glowing terms, in Godefroy's *Orchidophile*,† the immense masses in flower he discovered near Buga in 1869. F. C. Lehman states that during his travels in the Magdalena basin, he found this Cattleya very abundant.‡ Our own traveller, David Burke, collected it in 1883, and sent home the finest consignment ever received in this country from Ibagué, where it is very abundant, and where many of the best varieties are found. Still more recently it has been collected by Carder, near Popayan. All these collectors concur in reporting the extreme variability of the flowers as regards their colouration, which is fully borne out by the numerous plants now cultivated in British and continental collections. The most striking of the forms that have yet come under our notice are those described above; of these

* Bateman in Bot. Mag. sub. t. 5504.

† April, 1883, p. 572.

‡ Gard. Chron. XX. (1883), p. 24.



Cattleya labiata Trianae.



Cattleya labiata Warseewiezii.

Baroness Schroeder's and *delicata* are distinguished by the extreme delicacy of their colour, as are *Mr. Day's*, *Osman's*, and *Provost Russel's* not less so by the gorgeous colouration of the anterior part of the lip. *Mr. Lee's* is the largest-flowered form yet introduced, and *chocoensis* the most fragrant; *virginalis* is the purest white form, reminding one of Blunt's *Mendelii* and Wagener's *Mossiae*. Other forms of exceptional merit are in cultivation in Lord Rothschild's collection, at Tring Park; Sir Trevor Lawrence's, at Burford Lodge; Baron Schroeder's, at the Dell; Mr. Lee's, at Downside; Mr. Wrigley's, at Howick House, Preston; Mr. Nevill Wyatt's, at Lake House, Cheltenham; Mr. S. Courtauld's, at Bocking Place, Braintree; Mr. De B. Crawshay's, at Rosefield, Sevenoaks, etc., etc.

var.—*Warneri*.

Flowers large and open, 6—8 inches in diameter; sepals and petals delicate rose colour shaded with amethyst-purple, lighter in some flowers and darker in others; convolute portion of lip coloured externally like the sepals and petals, but sometimes deeper; anterior portion rich veined purple, usually margined with pale rosy amethyst-purple; disc tawny, or orange-yellow striated with pale lilac or white.

C. labiata Warneri, supra. *C. Warneri*, Moore, *vide Warner's Sel. Orch. I.* t. 8. *Fl. Mag.* 1871, t. 516.

This comes nearer to *C. labiata vera* than any of the varieties described above; so near, indeed, that from a botanist's point of view, no separate rank higher than that of a sub-variety can be assigned to it, although, in a horticultural sense, it is sufficiently distinct from the type to require separate notice here. Its native home is in southern Brazil, in a district not very remote from that in which the typical *C. labiata* once had its home, and from which it has been imported by Messrs. Low and Co., and other horticultural firms.*

This splendid *Cattleya* is dedicated to Mr. Robert Warner, of Broomfield, near Chelmsford, in whose collection it flowered for the first time in England in 1860. Its flowering season is in June and July.

var.—*Warscewiczii*.

Flowers among the largest in the group, 7—9 inches across; sepals and petals delicate rosy mauve; lip subpandurate, longer, with the anterior lobe broader and more spreading, and the apical sinus deeper

* The precise locality has not been divulged.

than in most of the *labiata* varieties; convolute lobes, usually coloured like the sepals and petals; anterior lobe rich crimson-purple, sometimes mottled and bordered with a paler shade of the same colour; disc golden yellow, often traversed by three or more parallel red-purple lines that are prolonged to the base of the lip, and from which shorter lines radiate obliquely on both sides; on each side of the disc is usually a large white or pale yellow space.

C. labiata Warscewiczii, Rehb. in *Gard. Chron.* XIX. (1883), p. 243. *C. Warscewiczii*, Id. *Xen. Orch.* I. p. 78, t. 31 (1855). *C. Warscewiczii Sanderiana*, Id. *Gard. Chron.* XVIII. (1882), p. 8. *C. Gigas*, Linden et André, Illus. hort. 1873, p. 70. *Id.* 1874, t. 178. *Fl. Mag.* n. s. t. 144. *The Garden XXI.* (1882), t. 337. *C. Gigas Sanderiana*, Hort. *C. Gigas burfordiensis*, Hort. *C. Sanderiana*, Hort. *C. imperialis*, Hort.

According to Professor Reichenbach, this superb *Cattleya* was discovered by Warscewicz, about the year 1848 or 49, in the province of Medellin, in New Granada; the greater part of his collection was, however, unfortunately lost by the breaking down of the vessel in which it was being conveyed down the river Magdalena, and the few plants that were saved subsequently died. Herbarium specimens were preserved, and from these it was figured and described by Reichenbach in his *Xenia Orchidacea*, under the name of *C. Warscewiczii*. Later, a few plants were received by Linden from M. Triana, one of which supplied the materials for the figure and description in *L'Illustration horticole*, but it was not till after it was re-discovered by Roezl, about the year 1870, in the same locality in which it was originally found by Warscewicz, that it became generally known as one of the finest *Cattleyas* of the *labiata* group.

Its geographical range is considerable; roughly speaking, it takes the place of *C. labiata Trianae*, north of the fifth parallel of north latitude, and spreads northwards as far as the seventh parallel; its eastern and western limits being the eastern and western Cordilleras respectively. The best known localities are:—Frontino, on the western Cordillera, where is collected the form called *imperialis*; from Amalfi southwards to beyond Medellin, on the central Cordillera; and from La Palma to beyond Flores, on the eastern Cordillera, whence was introduced the form known in gardens under the name of *Sanderiana*. In all these localities, this *Cattleya* grows chiefly upon trees by the sides of streams, and often well exposed to the sun; plants growing in the shade have their stems much drawn, and rarely flower. Notwithstanding its extensive range, the forms brought from the different localities resemble one another so closely as to present no

tangible characters by which they may be distinguished even as sub-varieties—a remarkable constancy compared with the extreme variability of *C. Trianae*.

C. labiata Warscewiczii generally flowers in the Orchid-houses of Europe in July and August, but it is not unusual for flowers to appear in May and June, so that the flowering season of this grand Cattleya lasts nearly one-third of the year.

Cattleya Aclandiae.

Stems slender, cylindric, furrowed, 3—5 inches long, terminating in two elliptic, spreading leaves, 2—3 inches long, from between which the 1—2 flowered peduncle is produced. Flowers 3—4 inches in diameter; sepals and petals similar, elliptic-oblong, fleshy, yellowish green transversely blotched and spotted with blackish purple; lip subpanduriform, three-



Cattleya Aclandiae.

lobed, the lateral lobes slightly incurved towards, but not embracing the column, white, tinted with pale rose, the intermediate lobe broadly reniform, emarginate, undulate, bright rose-purple veined with deep

purple. Column clavate, expanding into two wing-like margins, amethyst-purple.

Cattleya Acclandiae, Lindl. *Bot. Reg. XXVI.* t. 48 (1840). *Paxt. Mag. Bot. IX.* p. 1 (1842). Van Houtte's *Fl. des Serres VII.* t. 674 (1851). *Bot. Mag. t. 5039.* *Illus. hort. 1868.* t. 563. Williams' *Orch. Alb. II.* t. 69. *Epidendrum Acclandiae*, Rchb. *Xen. Orch. II.* p. 28.

Native of the Brazilian province of Bahia, where it occurs in the neighbourhood of the Atlantic Ocean growing on small isolated trees that are scattered over the arid lands (The Campos), over which the sea-breeze constantly blows.* *C. Acclandiae* is one of the smallest of the genus as regards its vegetation, and its flowers present one of those bold contrasts in colour not unusual among the Orchideæ; it is also one of the few species of Cattleya in which the lateral lobes of the lip do not enfold the column; it not unusually produces new growths and flowers twice in one year, first in May and June, and again late in the autumn. This Cattleya was dedicated by Dr. Lindley to Lady Accland, of Killerton, near Exeter, by whom it was introduced in 1839.

Cultural Note.—*C. Acclandiae* should be grown in teak baskets or shallow pans suspended near the roof glass in the warmest part of the Cattleya house, where it can receive the maximum of light; very little compost should be used, but it should be renewed as often as it shows signs of decay or exhaustion; the plants must receive liberal and frequent waterings during the growing season. If grown on a block of wood or cork, the block, with plant, should, during the growing season, be frequently dipped and held for a few seconds in water.

C. bicolor.

Stems terete, somewhat slender, 18—30 inches high, jointed and clothed with whitish membranous sheaths, diphyllous. Leaves oblong-lanceolate, about 6 inches long. Peduncles 2—5 or more flowered. Flowers 3—4 inches in diameter; sepals and petals fleshy with a distinct mid-nerve, variable in colour, usually greenish brown, but sometimes olive-brown spotted with purple, the sepals oblong, apiculate, the lateral two falcate, the petals obovate-oblong, wavy at the margin; lip oblong-cuneate, reflexed, with a depressed line in the centre and with the margins recurved, crimson-purple, but sometimes margined or banded with white. Column broad, arched, triquetral, quite exposed above, concave below, white stained with pale purple.

Cattleya bicolor, Lindl. in *Bot. Reg. 1836*, sub. t. 1919. Id. *Sert. Orch. t. 5* (1838). *Bot. Mag. t. 4909.* *Epidendrum bicolor*, Rchb. *Xen. Orch. II.* p. 27.

Introduced by Messrs. Loddiges, of Hackney, in 1838, from the neighbourhood of Bananal, in the Brazilian province of Minas Geraes,

* Du Buysson, *L'Orchidophile*, p. 232.

where it is found on the trunks and branches of the largest trees growing along the margins of the numerous small rivers and streams that traverse the district, sometimes forming enormous tufts in and about the forks of the principal branches. It also occurs on the mountains in the province of Rio de Janeiro, at an elevation of 2,000 feet, growing on the rocks as well as on trees, in places where the annual temperature ranges from 5° to 30° C. (40° to 85° F.). The sepals and petals are always of the sombre colour described above, sometimes paler, sometimes deeper; but the labellum varies in colour from deep crimson-purple to pale rose, sometimes further varied by being mottled, margined, or banded either longitudinally or transversely with white. The flowers appear occasionally at opposite seasons, viz., in March and September. The entire absence of the side lobes of the lip is peculiar to this species.

C. Bowringiana.

Stems clavate, 9—12 inches long, swollen at the base, diphylloous. Leaves narrowly oblong, 6—8 inches long, very leathery and deep green when matured. Peduncles purplish green, issuing from a pale green, elongated,



Cattleya Bowringiana.

narrow, compressed sheath, 5—10 flowered. Flowers among the smallest but most richly coloured of the genus; sepals and petals rose-purple with deeper veins and reticulations, the former oblong, acute, the latter much broader,

ovate-oblong, obtuse; lip oval-oblong, with a shallow sinus in the anterior margin, the basal half convolute over the column and coloured externally like the sepals and petals with a deep purple margin; the distal half open, deep purple with a maroon band on its basilar side, below which is a white blotch.

Cattleya Bowringiana, Veitch, Cat. 1886, p. 10, and supra. *C. autumnalis*, Hort. Introduced by us in 1884, from British Honduras in Central America, where, our correspondent informs us, it is found on the



Cattleya Bowringiana —One-fourth nat. size.

cliffs by the side of a rapid stream flowing over a succession of waterfalls, and where the atmosphere is always highly charged with moisture owing to the rapid evaporation from the stream during the dry season, and the excessive rain-fall at other times of the



Cattleya citrina.

year. Its nearest affinity is *C. Skinneri*, from which it differs chiefly in its more vigorous vegetation, its longer and more slender stems, its longer and narrower leaves, its smaller flowers that appear in the opposite season of the year, and its differently shaped labellum, which is not retuse at the apex. It is also of more easy culture and freer flowering, producing its richly coloured flowers in October and November, on which account it is especially valuable for decorative effect at that dull season. We have dedicated it with much pleasure to Mr. J. C. Bowring, of Forest Farm, near Windsor, for many years an ardent amateur of orchids.

C. citrina.

Pseudo-bulbs ovoid-spherical, 2—3 inches in diameter, enclosed in whitish membranous adhering sheaths, and bearing at their apex 2—3 ligulate, acute, somewhat flaccid, glaucous leaves, 4—7 inches long. Scapes quite pendulous, pale glaucous green like the leaves, 1—rarely 2—flowered. Flowers not patent, deep citron, approaching golden yellow except the margin of the anterior lobe of the lip, which is white; sepals oblong-ligulate, pointed; petals broader, elliptic oblong; lip broadly oval with a broad raised mid-line, obscurely three-lobed, the lateral lobes convolute over the column, the anterior lobe open and with a waved and notched margin. Column triquetral, coloured like the other parts of the flower.

Cattleya citrina, Lindl. Collect. Bot. sub. t. 37 (1821—24). Id. Bot. Reg. sub. t. 953 (1825). Id. Gen. et Sp. Orch. p. 117 (1831). Hook. Bot. Mag. t. 3742. Id. Cent. Orch. t. 31. Van Houtte's Fl. des Serres XVI. t. 368—69. Linden's Pesc. t. 9. Regel's Gartenfl. 1878, t. 931. Warner's Sel. Orch. III. t. 18. Sander's Reichenbachia I. p. 45. t. 20. C. Karwinskii, Martius Ausseahl. merku. Pl. p. 14. t. 10 (1829—31). Sobralia citrina, La Llave et Lex. Nov. veg. desc. II. p. 21 (1825). Epidendrum citrinum, Rehb. Xen. Orch. p. 32 (1862).

One of the most remarkable of Cattleyas, and the only one found within the Mexican territory proper, where it is abundantly distributed over the mountain ranges and high table-lands lying between the 17th and 20th parallel of north latitude at elevations ranging from 6,000 to 7,500 feet. Its peculiar inverted habit and handsome fragrant flowers early attracted the attention of naturalists, among the first of whom to make mention of it was the Jesuit Hernandez, who wrote on the Natural History of Mexican animals and plants in the seventeenth century, and who described this plant under the almost unpronounceable name of *Corticoatzontcoxochitl*, a name by which it appears to have been known at that period among the natives of the country, by whom the flowers were held in high esteem. It was first introduced into England by the Horticultural

Society of London, about the year 1823 or 24. The Society, however, possessed but a single plant of it, which appears to have died a short time after its introduction.* We find no further mention of it till 1838, when it was introduced from Oaxaca to the Duke of Bedford's collection at Woburn, where it flowered in April of the following year,† nor again till Ghiesbrecht, twenty years later, collected a considerable quantity on the slopes of the mountains of Michoacan for M. Linden's horticultural establishment at Brussels, whence it became generally distributed among the orchid collections of Europe.‡ From that time to the present, frequent importations have caused it to become a familiar object in almost every orchid collection in the country. The flowering season of *C. citrina* is in April and May. The specific name refers to the colour of the flower, which, when held in an erect position, has some resemblance to that of our native plant *Tulipa sylvestris*.

Cultural Note.—*C. citrina* has always been considered a refractory plant under cultivation, a circumstance that has arisen probably more from inattention to the climatic conditions under which it lives in its native country, than from any cause inherent in the plant itself. Growing in the "Tierra fria," or cool region of Mexico, where the atmosphere is comparatively dry for nearly six months of the year (November—April), and the rainfall during the remainder of the year not excessive for tropical latitudes, it follows that a cultural treatment as consonant with these conditions as the altered circumstances of a glass structure will admit, should be applied. The late Mr. J. C. Spyres once remarked "that few can boast of growing and flowering *C. citrina* well for half-a-dozen years together," and, therefore, it should be tried in various ways. When blocks of wood are used, which the inverted habit of the plant would seem to suggest as the most suitable medium for it, the plants should be securely fastened with wire, and the blocks suspended with the leaves downwards; they will succeed for a few years on the wood of almost any of our commoner trees, as the apple, hawthorn, birch, and box, as well as teak, over which the roots will creep freely. The blocks should be suspended in the coolest part of the Cattleya house, where they can receive the maximum of light and air. There is scarcely an orchid known that, for six months of the year, requires a more moderate supply of water than *C. citrina*; but when developing its growths, and the flower scapes appear, it should

* Lindley in Bot. Reg. 1824, sub. t. 953.

† Bot. Mag. sub. 3742. It was probably collected about the same time by Ross, for Mr. Barker, of Birmingham, but we find no evidence of his having done so.

‡ Linden's Pesc sub. t. 9.

be liberally supplied. We have, during the past few years, successfully established imported plants in small shallow pans with good drainage, surfaced with sphagnum and peat, and suspended from the roof. The new growths have been most satisfactory, and have produced flowers as fine as we have ever seen; but even here Nature vigorously asserts her right: the imported bulbs with their leaves are placed in the pan in an erect position, the new growths with their leaves take a horizontal one, while the subsequent growths assume their natural downward direction outside the pan.

C. *Forbesi*

Stems cylindric, about a foot high, diphyllous. Leaves ovate-oblong, coriaceous. Peduncles erect, 2—5 flowered. Flowers 3—4 inches in diameter; sepals and petals similar and subequal, oblong-lanceolate, pale yellow-green. Lip three-lobed, the two lateral lobes angular, convolute over the column, pale yellow externally, bright yellow on the inner side, sometimes streaked with red; middle lobe small, rotund with dentate margin, pale yellow with a broad bright yellow central band; basal area of lip rayed and spotted with reddish purple. Column clavate, terete above, yellow spotted and stained with red.

Cattleya Forbesii, Lindl. Collect. Bot. sub. t. 37 (1821-24). Id. *Bot. Reg.* t. 953 (1825). *Bot. Mag.* t. 3265. *Epidendrum Forbesii*, Rchb. Xen. Orch. II. p. 31.

Native of Brazil, in the neighbourhood of Rio de Janeiro, where it was once quite common on low trees and rocks near the sea. It was introduced by the Horticultural Society of London in 1823, through their collector, Forbes, whose name it bears. Although among the first of the Cattleyas cultivated in British gardens, the homely colours of its flowers find no favour with amateurs of the present day, and hence it is now but rarely seen in orchid collections.

C. *granulosa*.

Stems terete, compressed, jointed, 12—20 inches long, diphyllous. Leaves oblong-lanceolate, obtuse, 6 inches long. Peduncle stout, 5—8 flowered. Flowers 3—4 inches in diameter; sepals and petals yellowish olive-green, with a few scattered small red spots, the sepals oblong, obtuse, the lateral two falcate; the petals obovate-oblong, waved at the margin; lip three-lobed, the lateral lobes semi-ovate, erect, whitish externally, yellow within, the middle lobe clawed with a fimbriate subreniform blade, the claw yellow, the blade white, covered with numerous crimson-purple papulae. Column curved, whitish.

Cattleya granulosa, Lindl. *Bot. Reg.* 1842, t. 1. Van Houtte's *Fl. des Serres III.*, t. 198 (1847). *Epidendrum granulosum*, Rchb. Xen. Orch. II. p. 33.

var.—Russelliana.

Leaves ovate, broader. Flowers larger, with broader segments; the inner side of the lateral lobes of the lip and the claw of the middle lobe orange-yellow; the blade white, spotted with numerous crimson-purple papulae that are more densely aggregated on the basal side.

C. granulosa Russelliana, Lindl. *Bot. Reg.* 1845, t. 59. *C. granulosa*, *Bot. Mag.* t. 5048.

var.—Schofieldiana.

Flowers large and patent; sepals and petals tawny yellow densely spotted with crimson-purple; side lobes of lip cream-white externally, yellow with some purple markings near the anterior margin on the inner side; middle lobe covered all over with magenta-purple papulae.

C. granulosa Schofieldiana, supra. *C. Schofieldiana*, Rchb. in *Gard. Chron. XVIII.* (1882), p. 808. Williams' *Orch. Abb. II.* t. 93.

sub-var.—asperata (Gard. *Chron. XXVI.* (1886), p. 681), sepals and petals brownish, spotted with deep purple; anterior lobe of lip bright purple bordered with white.

Discovered in Guatemala in 1840 by Hartweg, who sent a single plant of it to the Horticultural Society of London without any intimation of the locality in which he gathered it; it was subsequently sent from the same country by Mr. G. Ure Skinner.* The variety *Russelliana* was sent to Sir William J. Hooker, from Woburn, as a plant of Brazilian origin. The variety *Schofieldiana*, also of Brazilian origin, is a more recent introduction, which flowered for the first time in the collection of Mr. G. W. Law-Schofield, at New Hall-Hey, Rawtenstall, near Manchester, in the autumn of 1882; its flowers are the most strikingly coloured of all the forms of *C. granulosa* yet known. The specific name refers to the papulae, formerly called *granulations*, on the lip.

C. guttata.

Stems cylindric, elongated, 20—30 inches high, diphyllous. Leaves spreading, elliptic-oblong, 6—9 inches long, very coriaceous. Peduncles with a short, sheathing, ancipitous bract, five—or more flowered. Flowers fleshy, 3—4 inches across; sepals oblong-lanceolate, obtuse, the lateral two sub-falcate; petals similar but broader and waved; both sepals and petals yellowish green spotted with deep purple; lip three-lobed, the lateral lobes ovate-oblong, acute, folding over the column, white externally; the intermediate lobe spreading, obcordate, with a shallow sinus in the

* Nevertheless, the statement that *Cattleya granulosa* occurs in Guatemala requires confirmation. No locality is given in which it has been gathered in that country, and we are not aware of the existence of any native dried specimens. On the other hand there are dried specimens in the Kew Herbarium labelled "Paraiba (Parahiba), N.E. Brazil," thus placing beyond doubt the true origin of the plant.

anterior margin, and traversed by several lines of papillæ, amethyst-purple. Column triquetral.

Cattleya guttata, Lindl. *Bot. Reg.* t. 1406 (1831). *C. elatior*, Id. Gen. et Sp. Orch. p. 117. *Epidendrum elatius*, Rchb. *Xen. Orch.* II. p. 33.

var.—Leopoldi.

Flowers somewhat smaller but more numerous, as many as from 12—20 frequently borne on one peduncle; sepals and petals brown sometimes green, spotted with deep purple, the spots sometimes large and scattered, sometimes small and crowded; lip bright amethyst-purple, the convolute lobes paler externally, white on the inner side.

C. guttata Leopoldi, Linden's *Pesc.* t. 43 (1860). Van Houtte's *Fl. des Serres*, t. 1471-72 (1861-62). De Puydt, *Les Orch.* t. 9. Williams' *Orch. Alb.* I. t. 16. *C. Leopoldi*, *Illus. hort. II.* t. 69.

var.—Prinzipii.

Stems taller, leaves and flowers usually larger, but many exceptions occur; sepals and petals pale rose-purple suffused with yellowish white



Cattleya guttata Prinzipii.

and spotted with amethyst-purple, the spots often aggregated towards and along the margins, chiefly on the distal half; anterior lobe of lip deep amethyst-purple.

C. guttata Prinzi, Rehb. Bonpl. IV, p. 327 (1856). *C. amethystoglossa*. Warner's *Sel. Orch.* I. t. 2 (1862-65). *Bot. Mag.* t. 5685. *Epidendrum elatius* Prinzi, Rehb. *Xen. Orch.* II. p. 173, t. 172.*

var.—Russelliana.†

Flowers larger; sepals and petals brownish green spotted with purple on the distal half; lateral lobes of lip pale rose-purple, anterior lobe deep purple.

C. guttata Russelliana, Hook. *Bot. Mag.* t. 3693 (1838). Id. *Cent. Orch.* t. 33.

Sub-vars. (distinguished by colour only).—*immaculata* (Gard. Chron. XXVI. (1886), p. 326), sepals and petals without spots, anterior lobe of lip deep purple; *lilacina* (Gard. Chron. XVI. (1881), p. 38), syn. *Keteleerii*; sepals and petals pale rose-purple spotted with deep amethyst-purple; side lobes of lip pale purple, anterior lobe deep purple; *phaeocoptera* (Gard. Chron. XIX. (1883), p. 688), sepals and petals deep purple; lip whitish; *punctulata* (Gard. Chron. XIV. (1880), p. 358), sepals and petals pale yellow-green with but few spots; lip as in var. *Leopoldi*; *Williams'* (Gard. Chron. XXII. (1884), p. 70; *Orch. Alb.* V. t. 212), sepals and petals pale purple tinged with olive-green, the former spotted, the latter blotched and streaked with deep purple; side lobes of lip pale purple, anterior lobe deep purple.

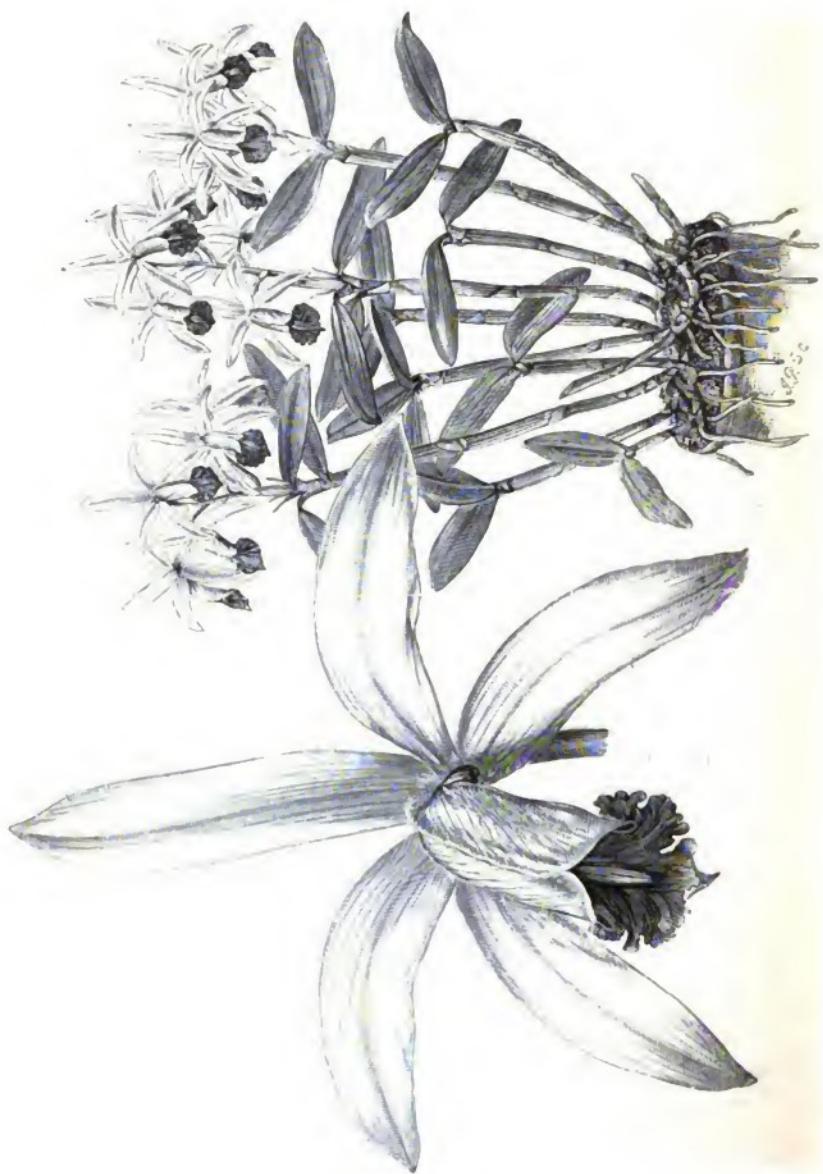
The typical *Cattleya guttata*, now rarely seen, was sent to the Horticultural Society of London from Rio de Janeiro, by the Right Hon. Robert Gordon, about the year 1827. The species is spread over parts of the Brazilian provinces of Bahia, Minas Geraes, Rio de Janeiro, San Paulo, and Santa Catherina, occurring in a great variety of situations. It is sometimes found on rocks, exposed to the scorching heat of the sun, and to frequent droughts, while at opposite seasons it is drenched by torrents of rain; in those places it sometimes grows in such dense masses as to exclude all other vegetation; it is also met with on isolated trees, and on the borders of the forest.‡ To its extensive geographical range, together with its diversity of station, must be ascribed the great variability of the species, especially as regards length of stem, size of flower, and the number of flowers produced on one peduncle. The variety *Leopoldi* is from Santa Catherina; it occurs at some distance from the ocean, in the small woods which, in that part of Brazil, lie between the forest and

* The *Cattleya* described and figured by Reichenbach in his *Xenia Orchidacea* II. p. 172, t. 171, under the name of *Epidendrum porphyroglossum*, and figured again in t. 172, for comparison with this variety of *C. guttata*, is unknown to us; we are not even aware of its being at the present time in cultivation in this country, although a variety of it, called *sulphurea* (Gard. Chron. 1866, p. 315), is said to have been introduced by Messrs. Low and Co.

† Not seen by us.

‡ M. Porte *sive* Du Buysson, *Orchidophile*, p. 238.

Cattleya intermedia.



open plains (Campos). It was introduced to European gardens about the year 1850, by M. Verschaffelt, of Ghent, through his collector, Devos, and was dedicated by him to Leopold I., King of the Belgians. The variety *Prinzi*ⁱ, better known in British gardens under the name of *Cattleya amethystoglossa*, first appeared in the collection of Herr Reichenheim, at Berlin, and was dedicated by Reichenbach, at that gentleman's request, to Herr Prinz, who had sent the plant from Brazil.* Its first appearance in England was in the collection of Mr. F. Coventry, at Shirley, near Southampton,† who possessed but a single plant of it, which passed into Mr. Warner's collection, at Broomfield, near Chelmsford, in 1860; since that date it has been frequently imported from its native home in the province of Bahia. The variety *Russelliana* was introduced from the Botanic Garden at Rio de Janeiro to the Woburn collection in 1838; it is said to have been brought from the Organ Mountains.

C. intermedia.

Stems cylindric, jointed, 10—15 inches high, as thick as the little finger, diphyllous. Leaves ovate-oblong, 5—6 inches long. Peduncles stoutish, 3—5 or more flowered. Flowers 4—5 inches in diameter, varying in colour from pale amethyst-purple to milk-white, the distal half of the sepals and petals occasionally dotted with amethyst-purple, the anterior lobe of the lip always amethyst-purple; dorsal sepal ligulate, acute; lateral sepals and petals sub-lanceolate; lip oval-oblong when spread out, distinctly three-lobed, the side lobes convolute over the column into a tube, the intermediate lobe spreading, with a crisped erose margin. Column clavate, bent, triquetral, stained with pale amethyst-purple.

Cattleya intermedia, Graham, in *Bot. Mag.* t. 2851 (1828). *Paxt. Mag. Bot.* I., p. 151 (1834). *Bot. Reg.* t. 1919 (1836). *C. amethystina*, Morren, *Jour. d'Hort.* IV. p. 201. *C. amabilis*, Hort. *Epidendrum intermedium*, Rchb. *Xen. Orch.* II. p. 34.

First made known to science and to horticulture in 1824, in which year it was brought by Captain Graham, of the Royal Packet Service, from Mr. Harrison, at Rio de Janeiro, to the Botanic Garden at Glasgow, where it flowered for the first time in this country, two years afterwards; it was subsequently imported by the Horticultural Society of London, in whose garden, at Chiswick, it flowered in 1834. Its geographical range in southern Brazil is

* Rchb: in *Xen. Orch.* II., p. 173.

† Warner's *Sel. Orch.*, sub. t. 2.

very extensive; it has been reported from various localities in the provinces of Rio de Janeiro, Minas Geraes, Santa Catherina, and even from Bahia. In the orchid-houses of Europe, where it has long been a great favourite on account of its delicately tinted sepals and petals and richly-coloured anterior lobe of lip, its flowering season is from April to June. The name *intermedia* was given to this species in reference to the medium size of its flowers, compared with those of the other species of Cattleya known to its author.

C. *iricolor*.

Stems clavate, compressed, 4—5 inches long, monophyllous. Leaves strap-like, a foot long, complicate at base, emarginate at apex. Peduncles half as long as the leaves, with a pale sheathing bract at their base, reaching to half their length, 2—3 flowered. Flowers 3—4 inches across, milk-white, except parts of the lip; sepals elliptic-lanceolate with revolute margins, the lateral two subfalcate; petals similar but narrower; lip obscurely three-lobed, the two lateral lobes convolute over the column, milk-white with a few purple streaks, a bright purple spot and an orange blotch near the anterior edge of each; middle lobe reflexed, acute, white with a transverse orange-yellow band at the base, on each side of which is a purple blotch. Column triquetral, white.

Cattleya iricolor, Rehb. in Gard. Chron. II. (1874), p. 162.

The only plant ever introduced of this very distinct Cattleya was acquired by us many years ago at one of the orchid sales at Stevens' Rooms, where it was sold without a specific name, and without any intimation of its origin. The plant is remarkable among Cattleyas for the length of its leaves in proportion to the height of its stems.

C. *Lawrenceana*.

Stems fusiform-clavate, compressed, furrowed longitudinally, clothed with an ashy brown membranous sheath, of variable length, the longest about 6 inches long, monophyllous. Leaves narrowly oblong, 7—9 inches long. Peduncles issuing from a brownish purple sheath, 5—7 or more flowered. Flowers 4—5 inches across; sepals linear-oblong, varying in colour from pale rosy purple to almost white; petals elliptic-oblong, undulate at the margin, as broad again as the sepals, and like them variable in colour, being usually a little deeper; lip oblong, emarginate, rolled over the column in the form of a bent tube from the base to two-thirds of its length and coloured externally like the other segments, the anterior third open, purple shaded with maroon, below which are

two white striated blotches, separated by a purple band that reaches to the base of the tube. Column clavate, triquetral, white.

Cattleya Lawrenceana, Rchb. Gard. Chron. XXIII. (1885), p. 338. Id. icon. xyl. p. 375. Sander's *Reichenbachia* I. t. 12. C. Mossiae, Schomb. Fl. Brit. Guiana, p. 1068 (1848).

var.—*rosea superba*.

Pseudo-bulbs and leaves more robust, the former divested of the membranous sheath. Flowers larger, of a delicate rosy purple striated with white; the sepals paler than the petals and lip, the disc of which is white.

C. Lawrenceana rosea superba, supra.

Sub-var.—*oculata*, central area of the lip buff-yellow, the usual purple band absent.

First discovered by Sir Robert Schomburgk during his exploration of British Guiana, 1840-44, in the sandstone region of the Roraima, who, however, mistook it for *C. Mossiae*. It was re-discovered in the spring of 1884 by Mr. Seidl, while collecting orchids for Messrs. Sander and Co. It was also met with shortly afterwards by Mr. Everard im Thurn, while botanically exploring the same region, and who gives the following account of its habitat:—

"It is found along the bed of the Kookenaam River, where it flows along the base of the south side of the twin mountains of Roraima and Kookenaam, at a level of about 3,750 feet above that of the sea. In the shelter afforded by the high banks of the river's channel, among the countless blocks of stone of all shapes and sizes, which here occupy the bed of the stream, grow many shrubs and stunted trees, and some few trees of greater height, most of which have been recently blasted by the hot breath of a savannah fire which, however, has left unscathed the lower plants down in the cool shelter of the channel. It is on the trunks and branches, often big and gnarled, of the shrubs and trees down in this valley that *Cattleya Lawrenceana* grows in abundant splendour."*

C. Lawrenceana is a splendid recent addition to the genus, flowering in the Orchid houses of Europe in March and April; it is dedicated to Sir Trevor Lawrence, Bart., M.P., President of the Royal Horticultural Society. Like its nearest affinities, the Cattleyas of *labiata* group, it is found to be a variable species, the most distinct deviation from the type that we have yet seen being that described above under the name of *rosea superba*; this is in the collection of Baron Schroeder, at The Dell, near Staines, where it proves to be a valuable addition even to that superb assemblage of brilliant Cattleyas.

* Gard. Chron. XXIV. (1885), p. 168.

C. Loddigesii.

Stems cylindric, 8—12 or more inches high, attenuated below, diphyllous. Leaves elliptic-oblong, 4—5 inches long. Peduncles 2—5 flowered. Flowers $3\frac{1}{2}$ — $4\frac{1}{2}$ inches in diameter; sepals and petals similar and sub-equal, elliptic-oblong, the lateral sepals subfalcate, the petals undulate at the margin, delicate rosy lilac; lip sub-orbicircular, three-lobed, the lateral lobes sub-rectangular, erect, with upper edge entire and anterior edge dentate, coloured like the sepals and petals externally, whitish on the inner side; intermediate lobe spreading, much crisped at the margin, pale amethyst-purple; disc whitish, passing downwards into pale yellow. Column clavate, triquetral, arched, produced laterally into wing-like expansions, white.

Cattleya Loddigesii, Lindl. Coll. Bot. sub t. 37 (1821—24). Id. Bot. Reg. sub. t. 953 (1825). *C. ovata*, Lindl. Bot. Reg. sub. t. 1919 (1838). *C. maritima*, Lindl. ibid. *Epidendrum violaceum*, Lodd. Bot. Cab. t. 337. Rchb. Xen. Orch. II. p. 32.

var.—*Harrisoniae*.

Stems generally, but not always, longer and more slender; the veins of the anterior lobe of lip swollen, rendering the surface corrugated, disc orange-yellow, traversed longitudinally by 3—5 raised lines, lateral margins deflexed.

C. Loddigesii, *Harrisoniae*, supra. *C. Harrisoniae*, Lindl. Bot. Reg. sub. t. 1919 (1838). *Taxt. Mag. Bot. IV.* p. 247 (1838). *Epidendrum Harrisoniae*, Rchb. Xen. Orch. II. p. 31.

Sub-var.—*candida*, flowers white, disc of lip yellow; *maculata*, flowers dotted with purple; *violacea*, flowers more deeply coloured than the usual type.

Cattleya Loddigesii was the first *Cattleya* introduced to European gardens, it having been received from Rio de Janeiro by Messrs. Loddiges, of Hackney, under the name of *Epidendrum violaceum* early in the present century. This name it retained till Lindley founded the genus *Cattleya* on *C. labiata* about the year 1821 or 22, when the plant was referred by him to that genus as the second species then known, and named in compliment to the horticultural firm that first introduced it. It is spread over Southern Brazil from the Organ Mountains to the Rio de la Plata, from the Atlantic Ocean almost to the river Uraquay, growing in a great variety of situations, sometimes on trees, sometimes on bare rocks, both in shade and in full exposure to all weathers—circumstances which more or less influence the habit of the plant, the size and colour of the flowers, etc., and which accounts for the many names the species has received. The variety *Harrisoniae* was introduced by Mr. Harrison, of Liverpool, in 1836; of the sub-varieties, *candida* is referable to this on account of the corrugations on the lip, and is the most

admired of all the *Loddigesii* forms. The usual flowering season is August and September, but the variety *Harrisoniae* sometimes produces its flowers at almost the opposite months of the year, viz., in March and April.

C. luteola.

A dwarf plant with a slender, creeping, branched rhizome. Pseudobulbs ovoid, slightly compressed, 1—3 inches long, monophyllous. Leaves elliptic-oblong, 3—4 inches long, emarginate or obtuse. Peduncles shorter than the leaves, 2—5 flowered. Flowers about 2 inches in diameter, pale lemon-yellow, except the anterior margin of the lip which is whitish, and the side lobes that are sometimes streaked with purple on the inner side; sepals and petals similar, oblong-lanceolate with reflexed tips; lip sub-orbicular, three-lobed, the side lobes convolute over the column, the terminal lobe spreading, crisped and dentate at the edge. Column semiterete, arched.

Cattleya luteola, Lindl. in *Gard. Chron.* 1853, p. 774. Rehb. *Xen. Orch. I.* p. 209, t. 83 (1856). *Bot. Mag.* t. 5032. *C. flavida*, Klotzsch. *Allg. Gartenz.* 1856, p. 73. *C. Meyeri*, Regel's *Gartenfl.* 1856, p. 116. *C. modesta* Meyer, *ibid.* *C. epidendroides*, Hort. *C. Holfordii*, Hort. *Epidendrum luteolum*, Rehb. *Xen. Orch. II.* p. 28.

The earliest notice of this, the smallest of Cattleyas, appeared in the *Gardeners' Chronicle*, in 1853, *loc. cit. supra*; it had, however, been in cultivation in Messrs. Backhouse's collection at York some time previous, and also in Messrs. Booth's horticultural establishment, near Hamburg; a little later a few plants were distributed by Messrs. Rollisson, of Tooting. All these came from the Brazilian Upper Amazon region,* but quite recently it has been received from Peru.† It usually flowers in the orchid collections of Europe in the months of November and December, but at Para, in Brazil, where it is cultivated by amateurs in the open air, affixed to orange and other trees, it continues growing throughout the year and is seldom out of flower.‡

C. maxima.

Stems clavate, variable in length, in one variety not more than 4—6 inches long, in another 10—15 inches long, always more or less compressed and monophyllous. Leaves also variable in size, oblong or ligulate-oblong, 6—10 inches long and 1½—2½ inches broad. Peduncles

* According to E. S. Rand (*American Garden*) it occurs on both banks of the river Solimoes (Amazon), but always in the shade, growing upon the trunks of trees in the thick woods that cover the drier grounds of the Várzeas.

† *C. luteola Roezlii*, Rehb. in *Gard. Chron.* XV. (1881), p. 782, but no locality is given.

‡ *Proceedings of the New York Hort. Soc.* 1883.

3—5 or more flowered. Flowers large and handsome, 5 inches across; sepals lanceolate, acuminate, smooth, pale satiny rose; petals oval-oblong, acute, wavy, nearly as broad again as the sepals, and coloured like them; lip oval-oblong, obscurely three-lobed, the side lobes angulate, convolute over the column into a tube; the intermediate lobe spreading, crisped at the margin, pale rose or whitish with a citron-yellow band traversing the entire length of the tube, on either side of which are numerous branching purple lines running obliquely from it. Column slender, obscurely angulate, white.

Cattleya maxima, Lindl. Gen. et Sp. Orch. p. 116 (1831). Id. Bot. Reg. 1844, sub. t. 5. *Id.* 1846, t. 1. *Bot. Mag.* t. 4902. Rchb. *Xen. Orch.* I. p. 225, t. 95. *Illus. hort.* 1870, t. 29. *Epidendrum maximum*, Rchb. *Xen. Orch.* II. p. 29.

Sub-vars.—*alba*, flowers white with the usual yellow blotch and purple markings on the lip; *aphlebia* (*Gard. Chron.* XXII. (1884), p. 394), the purple markings on the lip absent, the yellow blotch surrounded with pale purple; *Backhouse's*, stems short and thick, flowers of a deeper colour.

Cattleya maxima is a native of Ecuador and northern Peru, where it is spread over a considerable extent of country. It was first made known to science during the latter part of the last century by Ruiz and Pavon, two Spanish botanists, who had been sent out to Peru in 1777 by the Spanish Government to investigate the Cinchona forests of that country, and who gathered it on the Andes, near Guayaquil. Ruiz and Pavon's herbarium specimens were acquired by Mr. Aylmer B. Lambert,* from which this *Cattleya* was partially described by Lindley in 1831. Nothing more was known of it till it was gathered by Hartweg in 1842, on the banks of the Rio Grande de Malacotes (a name not found on any map to which we have access), and by whom living plants were sent to the Horticultural Society of London, and in whose garden, at Chiswick, they flowered in 1844, but appear to have died out some time afterwards. The next notice of *C. maxima*, as a horticultural plant, occurred in the autumn of 1855, when it flowered in the collection of Mr. W. G. Farmer, at Nonsuch Park, Cheam, Surrey; from that time to the present, it has been a constant occupant of the principal orchid-houses of Europe. There are two distinct forms in cultivation, which are thus distinguished:—the original *C. maxima*, gathered by Ruiz and Pavon, and Hartweg, has plump, short, crowded stems, with stiff upright leaves and deep coloured flowers; the other has longer and more slender stems, with thinner leaves and pale flowers.†

* The author of "The Genus *Pinus*." See *Manual of Coniferae*, p. 180.

† See Reichenbach's notes in the *Gardeners' Chronicle XIX.* (1883), p. 624. The short stemmed, i.e., the typical form, is known in most collections as Backhouse's variety.

The usual flowering season of *C. maxima* is the late autumn months; the specific name "largest" is scarcely appropriate, as most of the *labiata* varieties have still larger flowers.

C. Schilleriana.

Stems clavate, 4—6 inches high, furrowed, often tinged with reddish purple, diphyllous. Leaves elliptic-oblong, spreading, deep green above, reddish purple beneath. Peduncles 1—2 (rarely more) flowered. Flowers about 4 inches in diameter; sepals and petals similar, oblong-lanceolate, waved at the margin, variable in colour, usually purplish brown spotted as in *C. guttata*; lip oval-oblong when spread out, deeply three-lobed, the side lobes triangular, infolding the column, whitish externally, pale yellow streaked and margined with purple on the inner side; the intermediate lobe transversely reniform with fimbriate margin, crimson-purple marked with radiating whitish lines; disc yellow, traversed longitudinally by five sunk lines. Column clavate, triquetral, concave beneath, white streaked and spotted with purple.

Cattleya Schilleriana, Rehb. in Berlin Allg. Gartenzeit, 1857, p. 335. *Bot. Mag.* t. 5150, var. *concolor* (1859). Van Houtte's *Fl. des Serres*, t. 2236. C. Regnelli, Warner's *Sel. Orch.* II, t. 25 (1865-75). *C. Aclandiae*, var. *Schilleriana*, Jennings' *Orch.* t. 25 (1875). *Epidendrum Schillerianum*, Rehb. *Xen. Orch.* II, p. 38, t. 111.

This very distinct *Cattleya* first appeared in the collection of Consul Schiller, at Hamburg, in the autumn of 1857, whither it had been introduced from Brazil, probably Bahia. Two years later it was communicated by Messrs. Backhouse to Sir William Hooker, at Kew, but the flowers differing in colour from the original type, it was figured and described under the name of *C. Schilleriana concolor*; from that time to the present it has been sparingly imported on several occasions. It is one of the most variable of *Cattleyas* as regards the colour of its flowers, scarcely any two plants having been yet observed with flowers exactly alike. It bears strong evidence of being a natural hybrid between *C. Aclandiae* and *C. guttata*; its usual flowering season is April and May.

C. Skinneri.

Rhizome creeping, as thick as an ordinary writing pencil. Stems 7—9 or more inches long, clavate, attenuated below into a jointed footstalk, and bearing at their summit two spreading deep green oval-oblong leaves 6—8 inches long. Peduncles 5—9 or more flowered. Flowers 4—5 inches in diameter, beautiful rose-purple, the disc of the lip being white bordered with a broad zone of deeper purple;

sepals elliptic-lanceolate, spreading; petals ovate-oblong, as broad again as the sepals, undulate, recurved at the apex; lip oval-oblong, three-lobed, the side lobes convolute over the column, the anterior lobe open. Column small, clavate, triquetral, white.

Cattleya Skinneri, Lindl. Bot. Reg. 1840, Misc. 83. Batem. Orch. Mex. et Guat. t. 13 (1843). Paxt. Mag. Bot. XI. p. 193 (1844). Bot. Mag. t. 4270. Epidendrum Hugelianum, Rchb. Xen. Orch. II. p. 29.



Cattleya Skinneri.

var.—*parviflora*.

Flowers half the size of the typical form, with an acuminate lip, which is "whole coloured, and not pallid over all the lower half."

C. Skinneri parviflora, Bot. Mag. t. 4916.

Sub-vars.—*alba* (Gard. Chron. VII. (1877), p. 810; Williams' *Orch. Alb.* III. t. 112), flowers white with a small primrose-yellow blotch on the lip, and, occasionally, some mauve-purple markings at the base; *oculata*, lip with a large maroon-purple blotch.

First detected by Mr. G. Ure Skinner, in 1836, in the warm low-lying parts of Guatemala, along the shores of the Pacific Ocean; it was subsequently found at Metagalpa, in Nicaragua, by Dr. Oersted, and in Costa Rica and Veragua by Warscewicz.* In Guatemala it is called the *Flor de San Sebastian*, and is sought for by the country people to decorate the temples and shrines of their favourite saint, on account of its being in flower at the epoch at which the

* *Fide* Reichenbach, Xen. Orch. II. p. 29. The other localities given, as Trinidad, Caracas, &c., seem to require confirmation, or it may have been an introduced plant in those places.

day dedicated to the saint occurs.* The variety *parviflora* was also brought from Guatemala by Mr. Skinner, who found it growing "from the same stock" as the typical *C. Skinneri* and *Epidendrum Skinneri*, and thence supposed it to be a natural hybrid between the two†; the plant appears to have been long lost to cultivation and has never since been re-introduced. The white-flowered form was introduced by us from Costa Rica through Endres, and has, ever since its first appearance, been acknowledged as one of the loveliest white orchids in cultivation. *C. Skinneri* usually flowers in April and May.

C. superba.

Stems fusiform, 6—10 inches long, slightly compressed, furrowed, diphylloous. Leaves ovate-oblong, 4—6 inches long.‡ Peduncles 3—5 or more flowered. Flowers fragrant, 4—5 inches across; sepals and petals spreading, bright rose-purple suffused with white, the sepals oblong-lanceolate, smooth, the petals sub-rhomboidal, undulate; lip three-lobed, the side lobes acutely triangular, convolute over the column, magenta-purple, the intermediate lobe transversely oblong, slightly arched, emarginate, with erose edge, crimson-purple; disc yellow with a white blotch streaked with purple on each side. Column club-shaped, semi-terete, white.

Cattleya superba, Schomb. in Lindl. *Sert. Orch.* t. 22 (1838). *Paxt. Mag. Bot.* IX. p. 265 (1842). *Bot. Mag.* 4083 (1844). *Hook. Cent. Orch.* t. 31. Van Houtte's *Fl. des. Serres*, IX. t. 926. *Illus. hort.* 1869, t. 605 (var. *splendens*). Williams' *Orch. Alb.* I. t. 33. *Epidendrum superbum*, Rchb. *Xen. Orch.* II. p. 32.

This beautiful Cattleya was first discovered by the traveller Humboldt in the beginning of the present century near the cataracts of Atures, and in other places on the Orinoco; it was subsequently found by Dr. Martius, a German naturalist, who explored parts of northern Brazil (1818—21), near Tamura, on the Rio Negro; it was introduced to British gardens in 1838 by Sir Robert Schomburgk, who sent to Messrs. Loddiges, of Hackney, some plants which he had collected during his exploration of British Guiana, and which he found near the Essequibo, north of the mouth of the Rupununi, and thence southwards, growing on trees skirting the banks of the streams that meander through the savannahs between the third and fourth parallel.§ It is spread over an immense extent of territory

* Mr. G. Ure Skinner, *fide* Bateman.

† *Bot. Mag.* sub. t. 4916.

‡ "In its native country, both the stems and leaves vary considerably in size according to the situation in which the plants are growing. The flowers, too, vary in size and in intensity of colour."—E. S. Rand in *American Garden*.

§ Schomburgk Reisen in Brit. Guiana III. p. 907.

in equatorial South America; its southern limit is the course of the Amazon, from where it leaves the Peruvian territory to its juncture with the Rio Negro, a distance of upwards of 800 miles. It has never been found on the south side of the river, nor east of Manaos.* In a northern direction, it is found as far north as Colombia, Venezuela, and Guiana, chiefly in the neighbourhood of the great rivers, and growing under conditions very similar to those in which it occurs in the Amazon district. In the orchid-houses of Europe its usual flowering season is July and August.

Cultural Note.—Cultivators have frequently experienced a difficulty in inducing this Cattleya to flower so regularly as could be desired—a difficulty, we think, that must have arisen from overlooking the fact that it inhabits the low-lying and hot equatorial region described above, where the temperature ranges from 27°—32° C. (80°—90° F.) during the day, but sometimes descending to 13° C. (55° F.) during the night, and where, too, in addition to the enormous evaporation constantly going on in that region of lakes and swamps, the rainy season extends over more than six months of the year (December—June), when the country is often deluged for hours daily. It is successfully cultivated at Burford Lodge by attaching the plants to a portion of the stem of a tree-fern, it being noticed that it was advantageous to the Cattleya for its roots to intertwine with those of the fern. From the time the plants start into growth until they flower, they receive liberal supplies of water, and are suspended at the hottest end of the East Indian house. When in flower they are removed to a more light and airy position, where they remain to mature their growth. Should the plants make a second break before the flowers are faded, a circumstance not unusual in this species, they are removed to their former position in the East Indian House, where they remain all the winter. This Cattleya is much subject to the ravages of yellow thrip, which should be destroyed as soon as detected.†

At Para, in Brazil, where the temperature ranges from 23°—30° C. (74°—86° F.) in the shade, and where rain falls usually every afternoon, though sometimes only as a slight shower, *C. superba* is cultivated in the open air affixed to the stems of the Sapodilla (*Achras Sapota*), and on which the roots grow to an extraordinary length, an instance being recorded of a medium-sized plant growing four feet in one direction, and six feet in another. As the plants never rest they are seldom out of flower.‡

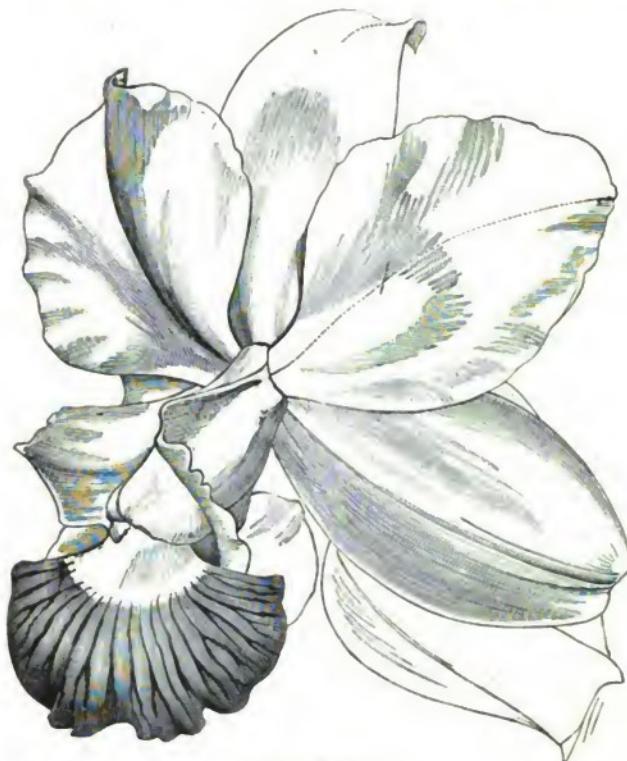
* In this part of South America an immense low-lying tract called the *Varzeas*, extending many miles northwards from the Amazon, is yearly inundated by the overflowing of the river, which has formed innumerable lakes and swamps. It is upon the tops of the lofty trees in this region, fully exposed to the sun and air, that *C. superba* has its home.—E. S. Rand in *American Garden*.

† See J. C. Spyres' cultural notes in the *Gardeners' Chronicle XI.* (1879).

‡ Proceedings of the New York Hort. Soc., 1883, p. 787.

C. Walkeriana.

Rhizome stoutish, flexuous. Stems fusiform, 2—5 inches long, monodiphyllous. Leaves elliptic-oblong, 3—5 inches long. Peduncles from short slender shoots issuing from the rhizome near the base of the foliar stems, 1—2 flowered. Flowers large for the size of the plant, flat, $3\frac{1}{2}$ — $4\frac{1}{2}$ inches in diameter, varying in colour from a bright rose-purple to a soft pale pink-lilac; sepals lanceolate, acute; petals ovate, as broad again as the sepals; lip panduriform, three-lobed, the side lobes sub-erect and partially enclosing the column at their base;



Cattleya Walkeriana.
(From the *Gardeners' Chronicle*).

the intermediate lobe spreading, reniform or sub-rotund, emarginate, with a white or pale yellow disc striated with purple, and with a broad anterior border of amethyst-purple. Column three-angled, narrow at the base, becoming broadly dilated towards the apex.

Cattleya Walkeriana, Gardn. in Hook. Lond. Jour. of Bot. II. p. 662 (1843). Paxton's *Fl. Gard.* I. t. 3 (1850). Linden's *Pesc.* t. 42 (1860). *Belg. hort.* 1880, t. 17. Williams' *Orch. Alb.* IV. t. 154. *C. bulbosa*, Lindl. in *Gard. Chron.* 1847, p. 623. *Bot. Reg.* 1847, t. 42. *Paxt. Mag. Bot.* XV. p. 49 (1849). *Epidendrum Walkerianum*, Rchb. *Xen. Orch.* II. p. 35.

var.—dolosa.

Peduncles produced from between the leaves of the fully developed stems; the side lobes of the lip overlapping the column to one-half or more of their length.

C. Walkeriana dolosa, supra. *C. dolosa*, Rchb. in *Gard. Chron.* V. (1876), p. 430. *Belg. hort.* 1876, p. 184. *Epidendrum dolosum*, Rchb. *Xen. Orch.* II. p. 224.

var.—nobilior.

Peduncles produced from slender shoots issuing from the rhizome, as in the type. Flowers somewhat larger, the edges of the side lobes of the lip meeting above the column along their entire length.

C. Walkeriana nobilior, supra. *C. nobilior*, Rchb. *Illus. hort.* 1883, t. 485. *Gard. Chron.* XIX. (1883), p. 728, icon. xyl.

var.—Schroederiana.

Stems slender, not thicker than an ordinary writing pencil, from the apex of which the usually two-flowered peduncles are produced. Flowers bright rose-purple striated with deeper purple; the side lobes of the lip reduced to two small, rounded auricles.

C. Walkeriana Schroederiana, supra. *C. Schroederiana*, Rchb. in *Gard. Chron.* XX. (1883), p. 102.

Discovered about the year 1839 — 40 by Gardner, during his travels in Brazil, "growing on the stems of trees overhanging a small stream which falls into the San Francisco River beyond the diamond district." A few years later, M. Libon, an energetic collector to whom horticulture is indebted for the discovery and introduction of many fine plants, and whose name is kept in remembrance by the genus *Libonia*, found this *Cattleya* in the vicinity of the Pico d'Itabira, in the province of Minas Geraes, growing "high up on the smooth and hard bark of a species of *Jacaranda*, scattered over an arid plain and exposed to the hot currents of air that frequently blow over it." M. Libon sent plants to M. Galeotti, in Belgium, but arriving in bad condition they soon afterwards perished; a second consignment in 1848 was more fortunate.* Previous to this, in May 1847, a *Cattleya*, whose origin is not recorded, had flowered in the collection of the late Mr. Sigismund Rucker, at West Hill, Wandsworth, to which Dr. Lindley gave the name of *C. bulbosa*, whence this name became generally in use in British gardens, notwithstanding the fact that Mr. Rucker's

* Linden's *Pescatorea*, sub. t. 42.

plant was subsequently referred to the species named and described by Gardner.

There is a peculiarity in the vegetation of *Cattleya Walkeriana* which especially distinguishes it from every other Cattleya, and which cannot be made sufficiently clear in a brief technical description. The flowers are not produced from the summit of the stems as in other Cattleyas, but from a small slender shoot, growing to a height of 1—1½ inches, which issues from the rhizome, near the base of one of the foliar stems. When first formed, this shoot is clothed with green scales, which, however, soon become dry; the peduncle arises from the apex of this shoot, and after the flowers have withered a new bud is formed, which, in time, is developed into a foliar stem.

The species is named after Edward Walker, who accompanied Gardner during a part of his journeyings, and, judging from the different localities from which it has been reported since its first discovery and the diversity of station in which it has been found, it is not only spread over a considerable geographical area,* but it is also represented by various local forms differing more or less from the original type. Among the known forms, *dolosa* and *Schroederiana* are certainly anomalous. The first was acquired by Mr. John Day, in 1872, at Stevens' Rooms, where it was offered as a Cattleya or Lælia from Minas Geraes, and supposed to be *L. Jongheana*; it does not differ from the type in any important character except that the peduncles are produced from between the leaves at the apex of the stems; it does not appear to have been introduced since, or even to have been again met with in its native country; hence the safest course, for the present, is to regard it as a polymorphism or local form of *C. Walkeriana*. The origin of the second is equally obscure. It was introduced by Messrs. Sander and Co., in 1883, either as a unique plant, or at most, in extremely limited quantity; but while it deviates from the type in a still greater degree than *dolosa*, especially in its slender stems and in the labellum, the side lobes of which are mere abortions, we are unwilling to regard it otherwise than an anomalous form of *C. Walkeriana*, till more definite information is forthcoming respecting its habitat, and

* Minas Geraes, Central Brazil, Mato Gross, Salinas, &c., which would imply an area half as large as Europe.

further importations of it are received that shall justify the specific rank as first assigned to it. The original plant is in the collection of Baron Schroeder, at The Dell. The variety *nobilior*, introduced by the Compagnie Continentale d'Horticulture, in 1882—83, differs in nothing from the typical *C. Walkeriana*, except in its larger flowers, in which the side lobes of the lip meet above the column along their entire length; but the extent of the overlapping of the side lobes of the lip and their consequent modification of form, although not to be overlooked from a botanical point of view, is, in this species, very variable.

LÆLIA.

Lindl. Gen. et Sp. Orch. p. 115 (1831). Benth. et Hook. Gen. Plant. III. p. 533 (1833).

In our introductory notes on *Cattleya*, we pointed out the close affinity that subsists between that genus and *Lælia*; so close, indeed, that the only clear distinction between them consists in the number of the pollinia, which in *Cattleya* are arranged in a single series of four, but which in *Lælia* are in two series of four, or eight in all. But even this distinguishing characteristic is subject to modification; the pollinia of the second series of four in some of the Brazilian *Lælias*, notably in *L. elegans*, are much smaller than those of the first series, which are always perfect, a circumstance which has suggested the hypothesis of those kinds with unequal pollinia being natural hybrids between species of *Cattleya* and *Lælia*—an hypothesis that is immensely strengthened by the occurrence of similar phenomena in hybrids obtained artificially between species of the two genera; indeed, in some of the latter, the pollinia of the second series of four are quite rudimentary. That the two genera pass into each other by gradations so small as to render a separating character difficult, if not impossible to be found, is evident enough to those who have had opportunities of studying the hybrids, now a rather numerous group, raised by horticulturists, and it is, therefore, much to be regretted that the distinguished authors of the *Genera Plantarum* should have thought fit to have still kept them distinct. In deference, however, to the ruling of that work, we have retained under *Lælia* all the species with two series of pollinia

of four each, including with them *L. Digbyana* and *L. glauca*, formerly referred to Brassavola, and all the hybrids in which the presence of the second series of four pollinia, however rudimentary their condition, has been detected.

The essential characters of Lælia, with the exception of the pollinia, being almost identical with those of Cattleya, it is unnecessary to recapitulate them here. It should, however, be noted that the Mexican and Guatemalian Lælias, including *albida*, *anceps*, *autumnalis*, *furfuracea*, *rubescens*, and *superbiens*, form a tolerably well-defined group, easily recognised by their ovoid or pyriform pseudo-bulbs which are usually of a pale pea-green colour when divested of their membranous sheaths; also by their long slender peduncles, in *L. superbiens* attaining a length of several feet, at the summit of which the flowers are clustered. These, as well as a few of the Brazilian species, have the disc of the labellum either lamellate or traversed by thickened nerves, a character that is almost absent in Cattleya.

The genus Lælia was founded by Dr. Lindley, who does not appear to have given any indication of the person to whom it is dedicated. The name itself was borne by females of the Roman patrician family of LÆLIUS, one of the most distinguished members of which, surnamed SAPIENS, was the friend of Scipio Africanus the younger, and the principal interlocutor in Cicero's immortal essay, "On Friendship" (*De Amicitia*). As at present circumscribed the genus includes about twenty-four recognised species, with numerous supposed natural and artificially raised hybrids.

Cultural Note.—With the exception of the Mexican species enumerated above, and with which for cultural purposes *Cattleya citrina*, *Lælia cinnabarinæ* and *L. flava* may be associated, the cultural treatment of most of the Lælias is the same as that of the Cattleyas. The Mexican Lælias have generally been looked upon as refractory subjects under cultivation, so much so that an orchid grower some time since complained of "the great contrast between the puny slender spikes we get on our cultivated plants and the sturdy fellows that are produced by imported plants"; and Mr. Day informs us that he had scores of plants of the beautiful *L. majalis* from the time he began to grow orchids, but not one could be induced to flower till June, 1873. The difficulty is unquestionably, to a great extent, one of climate, and much experience is yet required before it will be effectually obviated. In the meantime, reliable information respecting the climate of Mexico, and the conditions under which Lælias and other orchids grow in that country is gradually accumulating, and much new light is being thrown on the subject. Herr Roezl, who spent some years in the country collecting orchids and other

plants, in a communication to a German horticultural journal* observes of *Laelia autumnalis* that "it is one of those orchids which thrives in a temperate situation; it grows at an altitude of 7,000—8,500 feet upon rocks and stunted oaks, exposed to the sun as well as to the rain which falls during the wet season; the roots acquire a maximum of vigour and development in full sunshine. It is by no means a rare occurrence where this and other Mexican orchids grow, for the temperature to descend at night to as low as from 2° to 6° C. below zero (*i.e.*, from 4° to 10° F. below the freezing point), although such conditions of temperature are but of short duration." M. Kienast-Zöllly, of Zurich, who resided some time in the city of Mexico, has communicated to M. Godefroy's *Orchidophile* his experience of the climate of that city in its relation to orchids, having, during his stay there, successfully cultivated the native orchids in the open air.† The city is situated at about 7,000 feet above the level of the sea in lat. 19°.25 N., so that when the sun is near the northern solstice, in May and June, it is vertical to the city, or nearly so, for four or five weeks, during which time the temperature rises as high as 40°—50° C. (about 100°—120° F.); but in the opposite season, in November and December, it often descends at night to 1°—3° C. (*i.e.*, 3°—6° F.) below the freezing point. M. Zöllly's collection included several orchids that naturally grew at a lower elevation than that of the city, but they grew and flowered satisfactorily.

The temperatures just quoted are, however, the extremes; on the whole, the climate of the Mexican plateau is remarkably uniform, much resembling that of the summer at Paris, the mean temperature for the year being about 15° C. (60° F.).‡ The rainy season of that portion of the highlands lying between the 17th and 20th parallels of north latitude lasts scarcely five months, so that the climate is, comparatively speaking, a dry one. There is also another circumstance to be noted in relation to the climate of this region, although it can have no place in any consideration affecting the cultural treatment of plants coming thence:—at this elevation, the height of the barometric column ranges during the year from 21½ to 22½ inches; in other words, the atmospheric pressure, which at sea-level is about fifteen pounds to the square inch, is not more than from eleven to twelve pounds to the square inch on the Mexican plateau, and the capacity of the air for containing moisture is there diminished in a like proportion.

So far, therefore, as the altered circumstances of a glass structure in this country admit, the safest cultural treatment to be adopted for the Mexican Lælias may be thus formulated:—

The plants should be placed in well-drained pans that can be suspended near the roof-glass of the house, or on rafts of teak wood similarly suspended

* Deutsche Garten-Zeitung, 1881.

† June, 1883, p. 639.

‡ Grisebach *Veg. der Erde*, II. p. 320.



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in a horizontal position, that they may at all times receive as much light vertically as possible. Only a small quantity of compost is required, which should consist chiefly of sphagnum moss mixed with only a small quantity of the best fibrous peat.

The temperature of the house in which they are grown should not range higher than 15°—18° C. (60°—65° F.) by day, and 12°—15° C. (55°—60° F.) by night, by fire heat alone. The plants, by being suspended near the glass and exposed to the direct rays of the sun, are thence subjected to the greatest range of temperature during the year that it is possible to find for them within the limits of the house.

During the growing season, the plants should receive the maximum of air and light external circumstances admit of, including a few hours' direct sunlight in the early part of the day. Water should be freely supplied, both at the roots and by syringing from above; the latter should be done at least once, and even twice a day, according to the state of the weather.

When the season's growth is completed, the supply of water should be gradually diminished, and at length for a time, withheld altogether; the temperature, so far as it is maintained by fire heat, should be lowered, and the humidity of the atmosphere of the house should also be diminished; but exposure to the sun, with as much ventilation as external circumstances will safely admit of, should be continued. When at rest, nothing should be done to induce the plants to start into growth, before the natural period for their doing so arrives.

The plants should at all times be kept free from insect pests. (*See also cultural notes under Cattleya supra.*)

SYNOPSIS OF SPECIES AND VARIETIES.

Lælia albida.

Pseudo-bulbs crowded, ovoid or subpyriform, wrinkled when old, diphylloous. Leaves linear-lanceolate, acute, 4—7 inches long, leathery and deep green. Scapes slender, 15—20 inches long, jointed, with a pale brown sheathing bract at each joint, and terminating in a loose raceme of 5—9 flowers. Flowers 2 inches in diameter, fragrant, white, often faintly tinted with pale rose; sepals oblong-lanceolate; petals similar, but broader, and with a distinct mid-nerve; lip oblong, three-lobed, the lateral lobes erect, intermediate one reflexed; central area of lip from its base to two-thirds of its length traversed by three parallel canary-yellow ribs, of which the two lateral ones are sometimes spotted with purple. Column arched, white, the inner face sometimes stained with purple.

Lælia albida, Lindl. *Bot. Reg.* 1839, t. 54 *Bot. Mag.* t. 3957. Williams' *Orch. Alb.* III. t. 138. *Bletia albida*, Rehb. *Xen. Orch.* II. p. 37.

Sub-varieties, distinguished by colour only; *rosea* (*Fl. Mag.*, 1867, t. 335, *bella* Hort.), sepals and petals flushed with pale rose towards

their apex, lip bright rose; *salmonea*, sepals and petals salmon-red; *Stobart's* (Gard. Chron. VII., (1877), p. 271), sepals and petals with rose-purple tips, anterior lobe of lip bright purple; *sulphurea* (Gard. Chron. XXI. (1884), p. 76), flowers pale sulphur-yellow; *Tucker's*, sepals and petals amethyst-purple, anterior lobe of lip deep purple.



Lælia albida.

First introduced to European gardens in 1832, by Count Karwinsky, who found it growing on the oaks which cover the Cumbre de Molinos, and at San Pedro Nolasko, in the *Tierra fria* of Mexico, in the neighbourhood of Oaxaca, at an elevation of 7,000—8,000 feet; it was also collected by Hartweg, in the same region, in 1838. Since that date, frequent importations of *Lælia albida* have caused it to become one of the best known of Mexican Lælias, and, at the same time, one of the most disappointing, for few cultivators can boast of having satisfactorily grown and flowered the same plants for half-a-dozen consecutive years; its successful cultivation is, in fact, a thing yet to be achieved.

Of the sub-varieties, *rosea* or *bella* is the best known; the others, probably, have not been seen since their first introduction. The flowering season is November and December; the specific name *albida*, "whitish," refers to the flowers.

L. anceps.

Pseudo-bulbs invested with a lacerated membranous sheath, ovate-oblong, compressed, with two acute edges and with broad ribs on each of the flattened sides, mono—rarely diphyllous. Leaves oblong-lanceolate, 6—8 inches long,

very leathery in texture. Scape 2—3 feet long, jointed, with sheathing keeled bracts at the joints placed alternately and opposite along the scape, giving it the ancipitous aspect that suggested the specific name, the scape terminating in a cluster of 2—5 flowers, the pedicels and ovaries of which are viscidous. Flowers about 4 inches across; sepals lanceolate, acuminate, pale rose-purple; petals ovate, acuminate, half as broad again as the sepals and generally of a deeper colour; lip three-lobed, the two lateral lobes infolded over the column, pale rose bordered with purple externally, tawny yellow striped and margined with purple on the inner side; middle lobe



Laelia anceps.

oblong, apiculate, reflexed, rich purple-crimson; disc bright yellow traversed longitudinally by a thickened ridge and bordered with white in front. Column semi-terete, wingless.

Laelia anceps, Lindl. *Bot. Reg.* 1835, t. 1751. *Paxt. Mag. Bot. IV.* p. 73 (1838).
Bot. Mag. t. 3804 (1841). *Hook. Cent. Orch.* t. 24. *Jennings' Orch.* t. 6. *Williams' Orch. Alb. II.* t. 75. *Bletia anceps*, Rehb. *Xen. Orch. II.* p. 47.

var.—Barkeriana.

Petals narrower, almost like the sepals, anterior lobe of lip also narrower, more pointed and of a richer colour.

L. anceps Barkeriana, Lindl. *Bot. Reg.* t. 1947 (1837). Van Houtte's *Pl. des Serres*, t. 1100 (1856).

var.—Dawsonii.

Flowers larger; the petals sub-rhomboidal, much broader than in the commoner forms; sepals and petals white; convolute lobes of lip white stained with purple beneath, and streaked with radiating purple lines on the inner side; anterior lobe rich purple margined with white; disc yellow.

L. anceps Dawsonii, Gard. Chron. 1868, p. 27. *Fl. Mag.* t. 530 (1871). Warner's *Sel. Orch.* II. t. 34 (1865-75). Jennings' *Orch.* t. 6. Williams' *Orch. Alb.* I. t. 44.



Lælia anceps Dawsonii.

var.—*Williamsii*.

Flowers larger, the sepals and petals nearly equal; all the segments white except the usual yellow disc of the lip and the radiating purple streaks on the inner side of the convolute lobes.

L. anceps Williamsii, Hort. Sander *sive* Williams' *Orch. Alb. IV.* t. 190 (1885).

L. anceps stella, Rehb. in Gard. Chron. XXV. (1886), p. 136.

Sub-vars. distinguished from the typical *L. anceps* by colour only: *alba*, syn. *virginalis*, flowers white except the yellow disc of the labellum; *Baroness Schroeder's* (Gard. Chron. I. 3 s. (1887), p. 72), sepals and petals satiny rose, the latter with purple tips, disc of the lip orange-red with a yellow blotch on each side, the side lobes bordered with purple, the anterior lobe with maroon-purple; *blanda* (Gard. Chron. XXIII. (1885), p. 206), sepals and petals white tinted with pale rose, anterior margin of side lobes of lip rose dotted with purple, the anterior lobe deep purple; *leucosticta** (Gard. Chron. XXIII. (1885), p. 206), sepals and petals rose-purple, as in the type, but streaked and marked in various ways with white. *M. Kienast-Zöllig's** (Gard. Chron. XXV. (1886), p. 298), sepals white, petals and side lobes of lip tinted with pale rose, in other respects resembling the var. *Dawsonii*. *Mr. Calvert's* (Gard. Chron. XIX. (1883), p. 78), flowers white, the side lobes of lip margined with rose-purple, anterior lobe deeper purple. *Mr. Hill's* (Gard. Chron. XV. (1881), p. 169; Williams' *Orchid Album IV.* t. 146), sepals and petals white, but sometimes tinted with pale rose-purple, anterior and side lobes of lip with a broad margin of pale amethyst-purple, the latter yellow streaked with red-purple on the inner side, disc orange-yellow; *Mr. Percival's* (Gard. Chron. XIX. (1883), p. 110; Williams' *Orch. Alb. VI.* t. 256; Sander's *Reichenbachia I.* t. 36), sepals and petals of the palest rose-purple suffused with white, side lobes of lip yellow streaked with purple on the inner side, tipped with amethyst-purple externally, anterior lobe rich purple; *munda** (Gard. Chron. XXV. (1886), p. 298), sepals and petals pale satiny rose, side lobes of lip white streaked with purple on the inner side, anterior lobe deep purple; *rosea* (Gard. Chron. XIII. (1880), p. 104), sepals and petals white delicately tinted with pale rose, lateral and anterior lobes of lip margined with rose; *Sander's* (Gard. Chron. XXIII. (1885), p. 140), like the var. *Dawsonii*, reduced to the normal form and size; *Veitch's* (Gard. Chron. XIX. (1883), p. 274), sepals and petals white, side lobes of lip streaked and spotted with pale rose, anterior lobe rose-purple with deeper spots and streaks; *vestalis* (Gard. Chron. XIII. (1880), p. 136), flowers white with some purple stains on the side lobes of the lip; etc., etc.

Lælia anceps was first introduced into British gardens in 1835, by Messrs. Loddiges, of Hackney, and shortly afterwards by Messrs. Low and Co., of Clapton; it was formerly very abundant in the neighbourhood of Orizaba and Cordoba, where it is called by the

* Not seen by us.

natives *El toro*; it is widely distributed along the eastern side of the Cordillera from Orizaba northwards to Jalapa. The following interesting particulars respecting the native home of this popular orchid were communicated to the *Gardeners' Chronicle** by M. Kienast-Zöll, who resided many years in Mexico, and is now well known as an amateur of orchids at Zurich:—

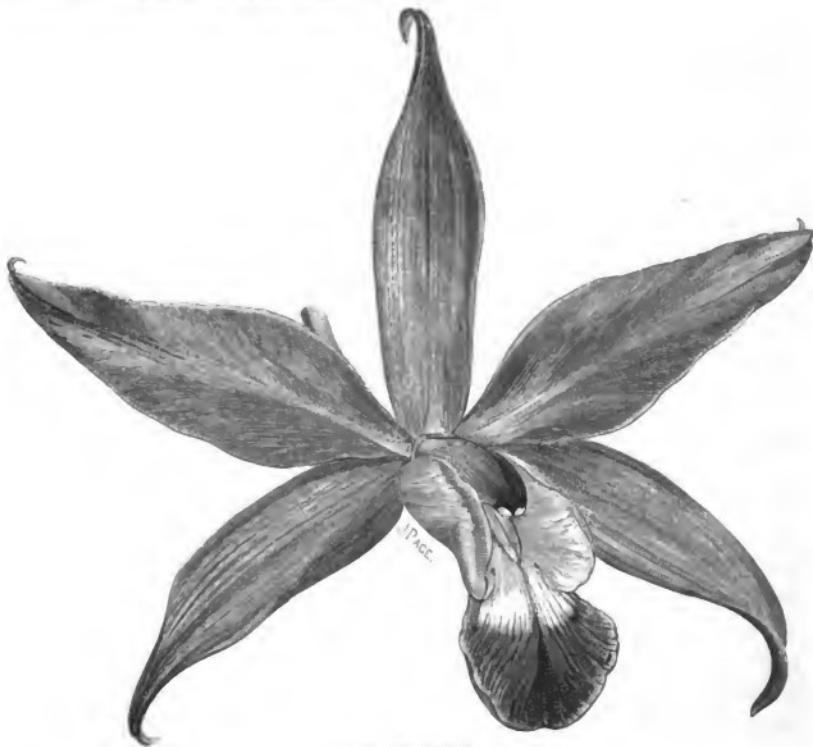
"This orchid is always met with on the borders of the virgin forest, growing on the trunks of trees, and on the very slender branches exposed to a powerful sun and to strong winds; often also clinging to rocks covered with the remains of leaves and moss under the same conditions. During the rainy season, from May to October, these plants are daily drenched by torrents of rain of which they experience the full force, often for five consecutive hours, and are thoroughly wet throughout the night. About 6 a.m., a sharp and fresh wind coming from the highest peaks of the Cordilleras, many of which are capped with perpetual snow, begins to dry the plants—a work which the burning sun completes—pitilessly shining on them for several hours, until the daily storm drenches them afresh. Under these conditions *Laelia anceps* grows with extraordinary vigour, and flowers about the end of October, or in November, just as the new pseudo-bulbs arrive at their perfect development. About the end of February, new roots start from the base of the bulb—this is the time of the short rainy season, called the Golden rain of the coffee planters—the fine rain falling almost like a fog; this rain is too weak to satiate the plants, it is hardly able to refresh them, so that the rest is scarcely interrupted by it. The pseudo-bulbs of plants fully exposed to the sun are always large, hard, and of a reddish colour, the leaves leathery and broad; whilst those plants which grow more in the shade have longer and thinner bulbs and leaves."

The variety *Barkeriana* was introduced by Messrs. Low and Co., in 1837, from the Orizaba district, and was dedicated to Mr. George Barker, of Birmingham, at that time the possessor of one of the finest Orchid collections in England; it has, since that date, occasionally appeared among importations from the same district. *Dawsonii*, still the most admired of all the varieties of *Laelia anceps*, "was found by M. Finck, in the neighbourhood of Cordoba, growing on a tree which was covered with it, but which was stripped, in 1874, by an Indian collector, who sold the plants in Mexico, where they were all lost."† The only importation of the plant into Europe was effected by Low and Co., in 1867, through their collector, Tucker. *Williams'* appeared among a recent importation, by Sander and Co., of St. Albans, and is said to have been found in a new locality near the Pacific coast,

* Vol. I, 3. s. p. 413 (1887). † Kienast-Zöll in Gard. Chron. loc. cit. supra.

along with several of the sub-varieties described above, including *Kienast-Zölly's*, *Sander's*, *munda*, &c., while *Baroness Schroeder's*, *Mr. Hill's*, *Mr. Percival's*, *Veitch's*, *rosea*, &c., are from the old locality, on the Atlantic side.

Laelia anceps and its varieties flower in December and January, when they form the most beautiful part of the display afforded by an orchid collection at that season.



Laelia autumnalis.

L. autumnalis.

Pseudo-bulbs sub-conical, tapering, curved, 4—6 inches long, ribbed and channelled, di-triphyllous. Leaves lanceolate, 5—7 inches long, very coriaceous. Scapes stoutish, dull crimson, 20—30 inches long, jointed, with a closely adherent scaly bract at each joint, and terminating in a loose raceme of 5—9 fragrant flowers, each 3—4 inches across; sepals and petals spreading, bright rose-purple, the former lanceolate, acuminate, the latter ovate, acuminate; lip three-lobed, the lateral lobes

erect, rounded, partially enclosing the column, white on the exposed side; middle lobe oblong, acuminate with recurved tip, whitish at the base, anterior part rose-purple; the disc is traversed longitudinally by two narrow, parallel raised lines, which are white spotted with purple along the edge, and by a third yellowish ridge which passes between the anterior portion of these and extends beyond them. Column clavate, bent, terete and purplish on the upper side, concave and white beneath.

Lælia autumnalis, Lindl. Gen. et Sp. Orch. p. 115 (1831). Bot. Reg. 1839, t. 27. Paxt. Mag. Bot. VI. p. 121 (1839). Bot. Mag. t. 3817 (1841). Batem. Orch. Mex. et Guat. t. 9 (1843). Hook. Cent. Orch. t. 26. Illus. hort. 1854, t. 17. *Bletia autumnalis*, Rehb. Xen. Orch. II. p. 56.

var.—*atrorubens*.

Flowers larger, of a brilliant crimson-purple, paler towards the centre.

L. autumnalis atrorubens, Hort. Backhouse in Gard. Chron. XII. (1879), p. 232. *The Garden*, XVII. (1880), t. 229. Williams' Orch. Alb. II. t. 49.

var.—*venusta*.

Flowers as large as those of the variety *atrorubens*, of an almost uniform rosy mauve.

L. autumnalis venusta, Hort. Backhouse, *The Garden XXV.* (1885), t. 438.

var.—*xanthotropis*.*

"Leaves smaller and shorter, petals very broad, anterior lobe of lip transversely oblong, keels yellow."—Rehb. Sepals and petals pale rose with a rose-purple apical blotch; lip rose-purple, yellow at the base.

L. autumnalis xanthotropis, Rehb. Sander's *Reichenbacia I.* t. 10 (1886).

The earliest notice of *Lælia autumnalis* as a horticultural plant in this country occurred in 1836, in which year it was received from Mexico by Mr. Tayleur, of Parkfield, near Liverpool.† Shortly afterwards it was sent to Mr. Barker, of Birmingham, by his collector, Ross, and it was subsequently imported in quantity by Messrs. Loddiges, Messrs. Low and Co., and other horticultural firms. It is spread over a considerable part of the Mexican highlands, where it affects a variety of situations, being found on the bare rocks, stunted trees, etc., often in immense masses, but always exposed to the full force of the sun and rain. *Lælia autumnalis* comes into flower towards the end of October and during the month of November, whence it has obtained in Mexico the name of *Flor de todos los Santos*, or All Saints' Flower. The variety *atrorubens*, unquestionably the finest form of *Lælia autumnalis* yet known, was introduced by Messrs. Backhouse, of York, in 1879; *venusta* is also an introduction of the same firm; *xanthotropis* was recently introduced by Messrs. Sander, of St. Alban's; it is, Professor Reichenbach remarks, a perplexing plant, probably a natural hybrid between *L. autumnalis* and *L. furfuracea*, an hypothesis strengthened by its flowering, *sive* Sander, in July and August.

* Not seen by us.

† Bateman, Orch. Mex et Guat. sub., t. 9.

L. cinnabarinæ.

Stems 5—10 inches long, cylindric, tumid at the base, clothed with whitish striated scales, mono—rarely diphyllous. Leaves as long as the stems, linear-oblong, erect, both stems and leaves sometimes tinged with purple. Peduncles slender, 15—20 inches long, with a narrow compressed sheath at the base, racemose, 10—15 flowered. Flowers $2\frac{1}{2}$ inches in diameter, of a bright uniform cinnabar red, on pedicels (including ovary) 2 inches long, of the same colour as the perianth; sepals and petals similar and equal, linear-lanceolate, acuminate; lip shorter than the other segments, three-lobed, the lateral lobes oblong, convolute over the column into a tube, and streaked with red on the inner side; the middle lobe narrowly ovate, crisped and reflexed. Column short, clavate, triquetral.

Lælia cinnabarinæ, Lindl. *Sert. Orch.* t. 28 (1838). *Paxt. Mag. Bot. VII.* p. 193 (1840). *Bot. Mag.* t. 4302 (1847). *Regel's Gartenfl.* 1867, t. 559. *Bletia cinnabarinæ*, Rehb. *Xen. Orch. II.*, p. 61.

var.—crispilabia.

Flowers amethyst-purple, the lip somewhat deeper in colour, and with the disc of the anterior lobe white.

L. cinnabarinæ crispilabia, supra. *L. crispilabia*, Warner's *Sel. Orch. II.*, t. 6.

Native of the southern part of the Brazilian province of Minas Geraes, and the adjacent parts of the province of Rio de Janeiro, at an altitude of 2500—3500 feet, growing always on the rocks, half concealed by the herbage that finds subsistence there. It was introduced in 1836 by Mr. Young, a nurseryman at Epsom, in Surrey, in whose establishment it flowered for the first time in this country in the spring of the following year. Owing to the flowers opening successively along the rachis from below upwards, the plant continues in bloom for upwards of six weeks, the first flowers generally expanding in March.

The variety *crispilabia*—or more properly sub-variety, for it differs in nothing from the type, except in colour, which is, however, very striking—first appeared in the collection of Mrs. Lawrence, at Ealing Park, whence it obtained the horticultural name of *Lælia Lawrenceana*. It has since been imported once in very restricted numbers by Messrs. Low and Co.; some of the flowers produced by plants of this importation showed a slight deviation in colour, especially in the lip, from that of the original *crispilabia*.

L. crispa.

Stems clavate, 7—10 inches long, compressed, with two or three shallow furrows on each of the flattened sides, monophyllous. Leaves sub-erect,

oblong-lanceolate, 9—12 inches long, emarginate, or obtuse. Peduncles issuing from an oblong, compressed sheath, 4—7 or more flowered. Flowers with the segments much crisped and undulated, 4—5 inches across; sepals obovate-lanceolate, petals broader, ovate-lanceolate, both sepals and petals white, sometimes tinted with pale purple towards the base; lip three-lobed, the side lobes convolute over the column, white externally, yellow on the inner side, the central area between them also yellow streaked longitudinally with purple; intermediate lobe oblong, reflexed, amethyst-purple, veined and reticulated with deep purple. Column clavate, triquetral, usually stained with plum colour on the side facing the lip.

Lælia crispa, Rchb. in Van Houtte's *Fl. des Serres IX*, p. 102 (1853). *Cattleya crispa*, Lindl. *Bot. Reg.* t. 1172 (1828). *Paxt. Mag. Bot.* V, p. 5. (1838). *Bot. Mag.* t. 3910 (1842). *Hook. Cens. Orch.* t. 32 (1849). *Belg. hort.* 1854, p. 161 (*reflexa macrophylla*). Regel's *Gartenfl.* 1868, t. 574. *Bletia crispa*, Rchb. *Xen. Orch.* II, p. 52.

Sub-var.—*Mr. Buchanan's* (Williams' *Orch. Alb. II*, t. 81), lip broad and open, of a rich crimson-purple mottled with white towards the margin; *delicatissima*,* flowers pure white with a few pale purple markings on the lip; *purpurea** (Warner's *Sel. Orch. II*, t. 9), sepals and petals tinted with pale purple, lip blotched with deep purple, with lines radiating towards the margin.

Native of the rich Lælia region in southern Brazil, growing on lofty trees fully exposed to the sun and air, and sometimes even on rocks in immense masses on the mountains near Rio de Janeiro, also in the southern parts of the province of Minas Geraes at an elevation of 2,500—3,500 feet. It was one of the first Lælias cultivated in Great Britain, it having been sent to the Horticultural Society of London from Rio de Janeiro in 1826 by Sir Henry Chamberlain; it flowered for the first time in this country, in the Society's garden at Chiswick, in August of the following year, when it was described by Dr. Lindley under the name of *Cattleya crispa*, the name by which it is still best known in orchid collections. As the pollinia are in two series of four each, or eight in all, it has been removed from *Cattleya* by later botanists. Its flowering season is from the middle of July to the end of August.

L. *Digbyana*.

Stems clavate, compressed, invested with white striated membranous sheaths when mature, monophyllous. Leaves linear, sometimes elliptic-oblong, fleshy, rigid, glaucous, 5—8 inches long. Peduncles emerging from an elongated, compressed sheath, one-flowered. Flowers fragrant, 4—5 inches in diameter; sepals and petals ligulate-oblong, spreading, pale yellow-green, the petals sometimes margined with pale rose; lip

* Not seen by us.

Laelia crispa.



Laelia elegans.



cordate in outline, convolute over the column at the base, emarginate, with a broadly fimbriate margin, cream-white; disc with a large green furrowed tubercle. Column semi-terete, winged.

Lælia Digbyana, Benth. et Hook. Gen. Plant. III. p. 534 (1833). *Brassavola Digbyana*, Lind. Bot. Reg. 1846. t. 53. Van Houtte's *Fl. des Serres*, 1847, t. 257. *Bot. Mag.* t. 4474. Williams' *Orch. Alb.* VI. t. 241. *Bletia Digbyana*, Rehb. *Xen. Orch.* II. p. 50.

Native of Honduras, in Central America; it was first introduced into England in 1846 by Mrs. McDonnell, the wife of the governor of the colony, who sent plants to Mr. St. Vincent Digby, of Minterne, in Dorsetshire, in whose stove it flowered for the first time in July of the following year. Ever since its introduction this orchid has been known in cultivation under the name of *Brassavola Digbyana*, although the propriety of Dr. Lindley's designation was questioned many years ago by Professor Reichenbach, who referred it to *Bletia*, in common with all the *Lælias*, placing it, with *L. glauca* and one or two others, between the Schomburgkias (which he also referred to *Bletia*) and the sub-section of the genus represented by *L. grandis* and *L. xanthina*. Mr. Bentham concurred with Reichenbach in removing *L. Digbyana* and *L. glauca* from *Brassavola*, on the ground that "they have not the characteristic perianth of *Brassavola*, and might be better placed in *Lælia*, near those Brazilian species which have petals scarcely broader than the sepals."* To this ruling we adhere, especially as there is, besides, a marked difference in habit between the two species in question and the typical *Brassavola*, they having altogether that of a *Lælia* (or *Cattleya*).

L. Dormaniana.

Stems terete, as thick as an ordinary writing pencil, 6—12 inches high, swollen at the base into small pseudo-bulbs, di—triphyllous. Leaves ovate-lanceolate, 4—5 inches long. Peduncles stout, shorter than the leaves, 2—3 or more flowered. Flowers 3 inches in diameter; sepals and petals similar, ligulate, spread out in a stellate manner, greenish olive-brown veined with purple, the petals narrower than the sepals, and with undulate margins; lip quadrate, three-lobed, the convolute side lobes pale rose-purple with purple veins; the anterior lobe scarcely projecting beyond the lateral two, amethyst-purple. Column wholly concealed by the lip, trigonal, white stained with purple.

Lælia Dormaniana, Rehb. in *Gard. Chron.* XIII. (1880) p. 168.

* *Journ. Linn. Soc.* XVIII, p. 315. He does not, however, seem to have been aware that the capsule of *L. Digbyana* (and probably that of *L. glauca*) differs from that of other *Lælias* in some structural details, notably in having angulate bands instead of acute ribs, and beneath which dehiscence takes place when the fruit is mature. It might be expected that further proofs of the affinities of *L. Digbyana* and *L. glauca* with other species of *Lælia* would be forthcoming from the operations of the hybridist, but the results obtained thus far are too indecisive to lead to any direct conclusion.

Discovered in September, 1879, on the mountains of Rio de Janeiro, at 1,500—2,000 feet elevation, by Mr. Henry Blunt, who sent plants to Mr. Bullen, of the Woodlands Nursery, at Lewisham. It is dedicated to Mr. Charles Dorman, of the Firs, Lawrie Park, Sydenham, in whose fine collection it flowered for the first time in this country in the spring of 1880. In this species only four full-sized pollinia are developed, the other four are very minute and quite rudimentary, a circumstance that has suggested the hypothesis of its being a natural hybrid, its supposed parents being, according to Reichenbach, *Cattleya bicolor* and *Lælia pumila*. As a considerable number of plants have been imported, and the flowers of these have proved remarkably uniform, we are more inclined to accept it as an established species.

L. elegans.

Rhizome almost as thick as the little finger. Stems somewhat distant, sub-terete, attenuated below, 12—20 inches high, mono—diphyllous. Leaves elliptic oblong, 8—12 inches long, leathery. Peduncles robust, 3—7 or more flowered. Flowers spreading, 5—6 inches in diameter, variable in colour; sepals and petals similar and sub-equal, slightly variable in form, usually oblong-lanceolate, but sometimes oblanceolate or obovate-lanceolate, amethyst-purple suffused with white, paler in some varieties, deeper in others; lip broadly oblong, three-lobed, the lateral lobes convolute over the column and usually coloured externally like the sepals and petals, but not infrequently paler and with a purple blotch at the tips on the inner side; the intermediate lobe transversely oblong, spreading, crimson-purple, sometimes continued down the centre of the lip to its base, margin paler. Column clavate, triquetral, white stained with purple.

Lælia elegans, Rehb. in Otto and Dietrich's Allg. Gartenzeit, 1855, p. 242. De Puydt, *Les Orch.* t. 21 (1880). *Cattleya elegans*, Morren in Ann. Soc. Agr. de Gand. IV. p. 95 (1848). *Bot. Mag.* t. 4700 (1853). Linden's *Pesc.* t. 23 (1860). *Illus. hort.* 1864, t. 402. *Bletia elegans*, Rehb. *Xen. Orch.* II. p. 55.

var.—alba.

Sepals and petals white, sometimes faintly flushed with pale amethyst-purple at the tips; side lobes of lip also white, but not infrequently with a purple blotch at the tip on the inner side; middle lobe rich amethyst-purple more or less striated with white or pale lilac towards the margin.

L. elegans alba,* Hort. *The Garden XVII.* (1880), t. 218. Williams' *Orch. Alb.* I. t. 30.

* This and the following varieties all differ from the older types of *Lælia elegans* as figured in the *Botanical Magazine*, Linden's *Pescatorea*, etc., not only in the colour of their flowers, but also in a slight degree in the form of the floral segments, especially the labellum. Moreover, several of the best known of them are represented in different orchid collections by plants whose flowers do not exactly conform to the first described type, although coming near enough

var.—gigantea.*

"Sepals and petals of a pale greenish white, suffused towards the tips with rose and slightly speckled with deep rose-purple; middle lobe of lip almost entirely of a deep violet-rose (amethyst-purple), throat of the tube white, and the tips of the lateral lobes amethyst-purple."

L. elegans gigantea, supra. *L. gigantea*, Warner's *Sel. Orch.* I. t. 6.

var.—prasiata.

"Sepals of a light magenta-rose, paler towards the base, having a greenish tint along the centre and a distinct flush of purple; petals of a deeper rose than the sepals, and with a slight tinge of green; side lobes of lip white changing to rosy crimson at the tips; anterior lobe magenta-crimson with deeper veins and paler margin."

L. elegans prasiata, Rehb. in lit. ad Day, 1863. Id. *Gard. Chron.* XIX. (1883), p. 11 (indica). Williams' *Orch. Alb.* III. t. 97.

var.—Schilleriana.

Sepals and petals white, but sometimes faintly tinted with pale rose as are the convolute lobes of the lip; anterior lobe rich purple, below which is a pale yellow blotch.

L. elegans Schilleriana, supra. *L. Schilleriana*, Rehb. in Otto and Dietrich's *Allg. Gartenzeit.* 1855, p. 322. *Flor. and Pomol.* 1859, t. 153. *L. Warneri*, Warner's *Sel. Orch.* III. t. 1. (1874). *Bletia Schilleriana*, Rehb. Xen. *Orch.* II. p. 53.

var.—Stelzneriana

Resembles the variety *Schilleriana*, from which it differs chiefly in having broader sepals and petals not revolute at the margin, and which are white, but in several plants in cultivation under this name rosy mauve; lip white or rosy mauve with a broad anterior margin of rich purple.

L. elegans Stelzneriana, supra. *L. Stelzneriana*, Rehb. in *Hamb. Gartenzeit.* 1860, p. 282. Van Houtte's *Pl. des Serres*, XIV. t. 1494-95.

var.—Turneri.

Sepals and petals amethyst-purple toned with rose; lateral lobes of lip white tinted with pale rose towards the margin, externally yellowish on the inner side with an amethyst blotch at the tips; anterior lobe amethyst-purple shaded with maroon.

L. elegans Turneri, supra. *L. Turneri*, Warner's *Sel. Orch.* I. t. 12. *L. elegans Littleana*, Hort.

var.—Wolstenholmiæ.

Sepals and petals pale amethyst-purple, passing to white at the base, veined and dotted with deep purple along the margins; side lobes of lip coloured externally like the sepals and petals, paler on the inner side with a purple blotch at the tips; anterior lobe amethyst-purple with a maroon disc that is prolonged into the tube.

L. elegans Wolstenholmiæ, Rehb. in *Gard. Chron.* 1865, p. 698. Warner's *Sel. Orch.* II. t. 29. Williams' *Orch. Alb.* VI. t. 285.

to it to come under the same name. On account of this variability, due no doubt to the hybrid origin of *L. elegans*, we have refrained from noting the form of the floral segments in the text, the general description being so framed as to include all the best known forms. Those marked (*) not seen by us.

Other forms have been described under the names of *Brygiana* (*Illus. hort.* 1857, t. 134); *Houtteana* (*Gard. Chron.* XX. (1883), p. 526); *irrorata* (*Xen. Orch. II.* p. 43, t. 115, *Bletia*); *intricata* (*Gard. Chron.* XXII. (1884), p. 7); *Measuresiana* (*Gard. Chron.* I. 3 s. (1887), p. 209); *picta* (*Gard. Chron.* XXI. (1884), p. 140); *platyphila* (*Id.* XXIV. (1885), p. 134).

Lælia elegans was discovered in 1847 on the Island of Santa Catherina, situated near the coast of the province of the same name in southern Brazil; it has since been collected on the mainland in several localities near and on the coast; its discoverer was a Belgian gardener named François Devos, at that time collecting orchids and other plants for the late M. Ambrose Verschaffelt, of Ghent, in whose establishment it flowered for the first time in Europe, in 1848. The variety *alba* was a later introduction from the same province; it has also been gathered on the Moraõ, a high mountain (part of the Serra do Mar) which rises abruptly from the rocky coast near Rio de Janeiro;* where it grows in a very elevated position on the bare cliffs facing the sea. *Gigantea* was introduced by Mr. Warner, of Bloomfield, near Chelmsford, in whose collection it flowered for the first time in the spring of 1862; it was shortly afterwards collected for Messrs. Low and Co., by Blunt. *Prasiata* was also collected by Blunt about the same time; it flowered for the first time in Mr. Day's former collection, at Tottenham. *Schilleriana* appeared in the collection of the late Consul Schiller, at Hamburg, in 1855. *Stelzneriana* was introduced five years later, and is named after one of the employés of the late M. Louis Van Houtte, of Ghent, in whose establishment it flowered soon after its introduction.† *Turneri* is the most richly coloured of all the *L. elegans* forms; it was dedicated to the late Mr. J. A. Turner, of Pendlebury, near Manchester, in whose collection it appeared about the year 1859. *Wolstenholmeae* is a distinct form that first appeared

* The Garden, XXIII. (1883), p. 461, but this name is not found on any map within our reach.

† In this and the preceding variety, between which the distinction is not always very clear, we have a greater departure from the original *Lælia elegans* than is seen in any of the other forms described above. The difference is chiefly in the labellum, the margins of the lateral lobes of which meet above the column to about two-thirds of their length only, they then diverge and are sinuate and wavy; the middle lobe is longitudinally oblong, concave with undulate margin, not transversely oblong and flat. The stems of the varieties are also much stouter than those of the other forms of *L. elegans*, approaching *L. purpurata* in this respect. All these differences seem to point to a nearer affinity to *L. purpurea* than to *Cattleya intermedia*, the other supposed parent.

in the former collection of Mr. Day, in 1865, and to whose sister, Mrs. Wolstenholm, it is appropriately dedicated.

From its first introduction, *Lælia elegans* has been observed to be extremely variable in the form as well as in the colour of its flowers, which has given rise to the hypothesis of its being a natural hybrid, *Lælia purpurata* and *Cattleya intermedia* being chiefly concerned in the parentage, with the more remote participation of *C. guttata* in the ancestry of some of the forms; thus, the commoner forms of *L. elegans*, and the varieties *alba*, *irrorata*, *Schilleriana*, *Stelzneriana*, bear very evident traces of descent from the two first-named species, while *gigantea*, *prasiata*, *Turneri*, *Wolstenholmiae* may have derived some of their peculiar coloration from *Cattleya guttata Leopoldi*. The hypothesis appears to us to be supported by several cogent considerations: (1) it is found growing in company with, or in close proximity to the species from which it is supposed to have been derived; (2) the leaves, although generally in pairs, as in *Cattleya intermedia* and *C. guttata*, are sometimes solitary as in *Lælia purpurata*; (3) the pollinia are always unequal, the upper series of four only being fully developed, while the lower series are much smaller, and sometimes quite rudimentary. Even in the vegetative organs, variability is frequently apparent, the stems and leaves sometimes approaching the robust form of *Lælia purpurata*, and sometimes the more slender and elongated form of *Cattleya intermedia* and *C. guttata Leopoldi*.

Lælia elegans flowers in the summer months; one or other of its numerous forms may be seen in bloom from May to September, and even later.

L. flava.

Stems stoutish, cylindric, 5—8 inches high, swollen at the base into small pseudo-bulbs, often tinged with deep purple, monophyllous. Leaves lanceolate, or linear-lanceolate, 4—6 or more inches long, very leathery in texture, deep green above, purplish beneath. Peduncles 12—18 inches long, with a narrow compressed sheath at their base, 5—9 flowered. Flowers medium size, of a uniform light orange-yellow; sepals and petals similar, ligulate, acute, the lateral sepals shorter, falcate; lip very narrow, three-lobed, the side-lobes semi-ovate, erect; middle-lobe oblong, crisped, traversed by four thickened nerves that are prolonged to the base. Column short, triquetral.

Lælia flava, Lindl. in Bot. Reg. 1839, misc. 142. *Id.* 1842, t. 62. *Bletia flava*, Rehb. Xen. Orch. II. p. 69.

Native of the Serra de Piedade, in the Brazilian province of Minas Geraes, also of the Serra do Frio, in the Diamond district, and in other localities,* always at a considerable elevation. It was introduced into British gardens in 1839, and flowered for the first time in this country in the autumn of the same year, in the collection of Sir Charles Lemon, at Carclew, in Cornwall. *Laelia flava* is very near *L. cinnabrina*, from which it may be easily distinguished by its shorter stems, usually of a deep purple hue; by its narrower, rather flaccid leaves that are purplish on the under side; by the yellow colour of its flowers, which have shorter sepals and petals; also by the bluntness of the middle lobe of the lip, whose nerves are more prominent and divergent instead of being nearly parallel as in *L. cinnabrina*.

L. furfuracea.

Pseudo-bulbs ovoid, striated, 2—3 inches long, furrowed when old, mono- rarely diphyllous. Leaves narrowly oblong, acute, 4—6 inches long, very leathery. Peduncles longer than the leaves, 1—3 or more flowered. Flowers 4—5 inches in diameter; sepals lanceolate, acute, pale rose-purple; petals broader, sub-rhomboidal, coloured like the sepals; lip three-lobed, bilamellate, the side lobes rotund, erect, paler in colour than the sepals and petals; intermediate lobe oblong, reflexed, bright purple. Column clavate, terete above, pale rose-purple.

Laelia furfuracea, Lindl. *Bot. Reg.* 1839, t. 26. *Bot. Mag.* t. 3810. Hook. *Cent. Orch.* t. 25. *Bletia furfuracea*, Rehb. *Xen. Orch.* II, p. 56.

First discovered by Count Karwinsky, about the year 1832, in the neighbourhood of Oaxaca, at an elevation of 7,500—8,500 feet, and since gathered by different collectors at Santa Barbara, San Juan del Estado, and other places in Mexico, but always at a very high elevation. It was first introduced into England by Mr. Barker, of Birmingham, in 1838. Its nearest affinity is *L. autumnalis*, from which it differs in its smaller ovate pseudo-bulbs, erect leaves, and especially in its undulated rhomboid petals and acuminate lip. The ovary is covered with black mealy glands which suggested the specific name.

L. glauca.

Stems produced from a stout rhizome at intervals of about an inch, 3—4 inches long, compressed, monophyllous. Leaves oblong, coriaceous, glaucous, 4—6 inches long. Peduncles as long as the leaves, enclosed in a brown compressed spathaceous bract, one-flowered. Flowers 3—4

* Gardner was probably the first to detect it.—“At Lavrinha, situated at the southern extremity of the Serra, in a hollow surrounded by rocky hills, were two fine Orchideous plants, both species of the beautiful genus *Laelia*, one bearing violet coloured, and the other bright yellow flowers.”—*Travels in Brazil*, 1836—41.

inches in diameter, very fragrant; sepals and petals similar, lanceolate, obtuse, pale olive-green; lip cordate, acute, convolute at the base, lobed at the margin, white, sometimes with a small purple blotch at the entrance of the tube. Column short.

Laelia glauca, Benth. et Hook. Gen. Plant III. p. 534 (1883). *Brassavola glauca*, Lindl. Bot. Reg. 1839, misc. 67. *Id.* 1840, t. 44. Batem. *Orch. Mex. et Guat.* t. 16. *Bot. Mag.* t. 4033. Hook. *Cent. Orch.* t. 22. *Bletia glauca*, Rchb. *Xen. Orch.* II. p. 50.

Originally sent to England by a Mr. Henchman, who discovered it in the neighbourhood of Xalapa, in Mexico; it was subsequently met with in the same locality by Hartweg, who sent plants to the Horticultural Society of London in 1837; it was also detected later by Mr. G. Ure Skinner, in Guatemala, growing on oaks in company with *Cyrtochilum (Oncidium) maculatum*. It is better known in gardens under the name of *Brassavola glauca* than that under which it is described above, but for reasons similar to those given under *L. Digbyana*, it has been removed from *Brassavola*.

Cultural Note.—*Laelia glauca* requires the same general cultural treatment as the other Mexican *Laelias*. It flowers freely when grown in a teak basket, or on a block of wood suspended near the roof glass, under the influence of direct sun-light. When in flower, the delightful fragrance of its blossoms scents the house in which the plants are growing, particularly towards evening, for which reason alone it is worth cultivating. Its flowering season is February and March.

L. grandis.

Stems clavate-fusiform, compressed, attenuated below, monophyllous. Leaves oblong-lanceolate, rigid, 8—10 inches long. Peduncles issuing from a broad, compressed, ancipitous sheath, 3—5 flowered. Flowers 4—5 inches in diameter; sepals elliptic-lanceolate, wavy, twisted, nankeen-yellow; petals broader, rhomboid-ovate, similarly coloured; lip three-lobed, the lateral lobes convolute into a tube, white externally; the intermediate lobe rotund, slightly crisped, white veined with rose-purple. Column short, trigonal.

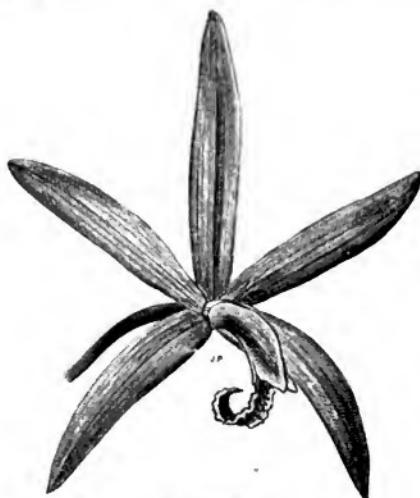
Laelia grandis, Lindl. in Paxt. Fl. Gard. I. p. 60 (1850). *Id. Gard. Chron.* 1864, p. 1202. *Bot. Mag.* t. 5553. Regel's *Gartenfl.* 1871, t. 698. Van Houtte's *Fl. des Serres* 1882, t. 2473. Williams' *Orch. Alb.* III. t. 123. *Bletia grandis*, Rchb. *Xen. Orch.* II. p. 51.

Laelia grandis first became known in European gardens in 1849, in which year it was sent to M. Morel, at Paris, by his countryman, M. Pinel, who had found it in the neighbourhood of Bahia, in Brazil.* In the following year it was exhibited at one of the London Shows, but nothing more was seen of it till 1864, when a

* Du Buysson, L'Orchidophile, p. 358.

few plants were received by Messrs. Low and Co., from their collector at Bahia; * it was also received about the same time, from the same port, at the Royal Gardens at Kew. That it inhabits the hot and humid district around the bay of Todos os Santos appears certain, but the extent of its geographical range is, at present, unknown.

Cultural Note.—The geographical position of *L. grandis* and the closely allied species *L. xanthina* indicates a higher mean temperature and a moister atmosphere, especially during the growing season, for these orchids than for the other Brazilian Lelias. Their cultural treatment should therefore conform to that of *Cattleya superba*, *C. Aclandia*, and *C. Schilleriana*.



Lelia harpophylla.

L. harpophylla.

A tufted plant with slender, erect, cylindric stems, 9—18 inches high, invested with whitish membranous sheaths, each bearing at its summit a solitary, narrowly ligulate, acuminate leaf 6—8 inches long. Peduncles shorter than the leaves, with a pale sheathing bract at their base, 4—7 flowered. Flowers 2—3 inches across, bright cinnabar-red, except the anterior lobe of the lip, which is whitish; sepals and petals equal, lanceolate, acute; lip three-lobed, the side-lobes triangular, overlapping the column; middle-lobe oblong, reflexed with a crisped margin and with two raised median lines. Column angular, bent.

Lelia harpophylla, Rehb. in Gard. Chron. 1873, p. 542. *Fl. Mag.* n.s. t. 372 (1879). *The Gardner*, XXIV. (1883), t. 402. Williams' *Orch. Alb.* III. t. 117.

* *Bot. Mag.* sub. t. 5553.

Till quite recently, this was one of the rarest Orchids in cultivation. Our earliest knowledge of it was from a plant in the collection of the late Mr. Sigismund Rucker, at West Hill, Wandsworth; and from another, in Mr. Day's former collection, at Tottenham, where they had been in cultivation since 1865. A drawing by the last-named gentleman, still in his possession, was made in April, 1867, the first time of its flowering in this country. Within the last few years a considerable number of plants have been imported from southern Brazil, but we find no record of the locality in which they were collected. The specific name is from *ἀρπη* (harpé) a sword, and *φύλλον* (phullon) a leaf, in reference to the form of the leaves.

L. Jongheana

Stems form a stout rhizome, sub-fusiform or oval-oblong, compressed, $1\frac{1}{2}$ —2 inches long, monophyllous. Leaves oval-oblong, 3—4 inches long, rigid and erect. Peduncles shorter than the leaves, 1—rarely 2—flowered. Flowers 4—5 inches in diameter, spreading, nearly flat, of a soft rose-purple, the lip with a yellow disc, in front of which is a white blotch; sepals lanceolate, acute; petals broader, elliptic-oblong, obtuse; lip oval-oblong, three-lobed, lateral-lobes triangular, middle-lobe obtuse, emarginate, all with crisped and moderately-toothed margins; disc with seven ridges. Column slender, triquetral, pale rose-purple above.

Lelia Jongheana, Rehb. in Gard. Chron. 1872, p. 425. *Bot. Mag.* t. 6038. *Revue Hort.* 1873, p. 291. *Fl. Mag.* n. s. t. 177.

Discovered in southern Brazil, locality not given, about the year 1854, by the ill-fated traveller, Libon, who fell a victim to his zeal for collecting new plants not long afterwards. He sent this *Lelia* to M. de Jonghe, at Brussels, after whom it is named in accordance with the wish of its discoverer. It seems to have disappeared from cultivation for some years, as nothing is recorded of it till 1872, when a plant flowered in MM. Thibaut and Keteleer's horticultural establishment, at Sceaux, near Paris. It is now, fortunately, represented in several British collections, usually flowering in March.

L. Lindleyana

Stems slender, cylindric, 5—8 inches high, diphyllous. Leaves linear-lanceolate, acute, 4—5 inches long, rigid and leathery. Peduncles shorter than the leaves, two or more flowered. Flowers 4 inches in diameter; sepals and petals lanceolate, acute, spreading in a stellate manner, white tinted with pale rose-purple, sometimes sparingly spotted with amethyst-purple; lip broadly oblong, obscurely three-lobed, the side lobes convolute

over the column; the middle lobe concave, white, stained with purple and spotted with deep purple in the centre. Column clavate, triquetral.

Laelia Lindleyana, supra. *Cattleya Lindleyana*, Rehb. in Berl. Allg. Gartenzzeit 1857, p. 118. *Bot. Mag.* t. 5449. *Bletia Lindleyana*, Rehb. *Xen. Orch. II.* pp. 65, 112, t. 195.

First introduced by M. Linden from Santa Catherina, in southern Brazil, in 1857. It was sent to the Royal Gardens at Kew by Mr. C. H. Williams from Bahia in 1863.* So little is recorded of the habitat of this *Laelia*, and so seldom is it seen in orchid collections in this country, that it may be assumed to be a rare plant even in Brazil. The unequal pollinia suggest a hybrid origin in which *Cattleya intermedia* may have participated.

L. lobata.

Rhizome stoutish, creeping. Stems spindle-shaped, attenuated below, compressed, 4—8 inches high, monophyllous. Leaves oblong, erect, leathery, 8—10 inches long. Peduncles issuing from a compressed spathe, 2—5 flowered. Flowers 5 inches across; sepals lanceolate with reflexed margins, pale rose-purple with deeper purple veins and reticulations; petals oval, obtuse, wavy and crisped, twice as broad as the sepals and coloured like them; lip broadly oval, three-lobed, the side lobes convolute over the column, coloured externally like the sepals and petals; the intermediate lobe spreading, much crisped at the margin, rich amethyst-purple with paler striations. Column stoutish, triquetral, pale lilac.

Laelia lobata, supra. *Cattleya lobata*, Lindl. in *Gard. Chron.* 1848, p. 403. *Laelia Boothiana*, Rehb. *Xen. Orch. I.* p. 218, t. 91 (1858). L. Rivieri, Carrière, *Rev. Hort.* 1874, p. 33. *Bletia Boothiana*, Rehb. *Xen. Orch. II.* p. 51.

This orchid was first described by Dr. Lindley, under the name of *Cattleya lobata*, from a plant which flowered in Messrs. Loddiges' nursery, in 1847, and which had been received from Brazil. A few years afterwards Professor Reichenbach described and figured it in his *Xenia Orchidacea*, under the name of *Laelia Boothiana*, dedicating it to Herr Lorenz Booth, of Flotbeck, near Hamburg, in whose collection the plant, which furnished him the materials for description and figuring, had been in cultivation many years without flowering. In neither case was any information forthcoming respecting the locality in which this orchid is found, or the conditions under which it grows in its native country, and our knowledge of these necessary particulars is still very meagre. Although believed to be spread over parts of southern Brazil, we know of only one station on the coast

* Probably the plant sent to Kew from Bahia was simply shipped from that port, whither it had been sent from another locality.

Laelia lobata.



of Rio de Janeiro, where it grows high up on a bare rock that is washed by the ocean below, and where it is fully exposed to the sun from morning till night, a fact of which cultivators should take note, the more especially as the species, although growing vigorously under the usual cultural treatment of Cattleyas and Lælias, often fails to flower.

The name *lobata* was given by Lindley on account of "the excessive lobing of the petals and lip;" this character is, however, greatly exaggerated in the woodcut accompanying the description. Its nearest affinity is *L. crispa*, from which it may be distinguished chiefly by its differently shaped shorter pseudo-bulbs, by its differently coloured flowers with longer column, and by its season of flowering, which is usually April and May.

L. majalis.

Pseudo-bulbs clustered, ovoid, pale green, furrowed and wrinkled when old, mono-diphyllous. Leaves lanceolate, leathery, 5—6 inches long. Peduncles as long as the leaves, 1—rarely 2-flowered. Flowers 6 inches in diameter; sepals lanceolate, smooth, pale rosy lilac; petals oval-oblong, as broad again as the sepals, but coloured like them; lip oblong, three-lobed, the lateral lobes small, convolute over the column, white tinted with pale lilac towards the margins; the intermediate lobe spreading, emarginate, traversed longitudinally by a pale yellow raised line which becomes broader towards the base, centre white spotted with purple, and with a broad margin of mauve-purple.

Lælia majalis, Lindl. Bot. Reg. 1839, misc. 42. *Id.* 1844, t. 30. Batem. *Orch. Mex. et Guat.* t. 23. Paxt. *Mag. Bot. XII.* (1845) p. 1. *Bot. Mag.* t. 5667. *Belg. hort.* 1869, p. 129. *Bletia speciosa*, Humb. et Kunth, Gen. et Sp. Nov. I. p. 342 (1815). *B. grandiflora*, La Llave et Lexarza, Nov. Veg. desc. II. (1825). Rchb. *Xen. Orch.* II. p. 55.

One of the first of the Mexican orchids known to science, it being mentioned by the Jesuit Hernandez, in his Natural History of New Spain, published in the seventeenth century.* It was detected by Humboldt, in the beginning of the present century, on the mountains, near the Pacific coast, between Acapulco and Playas de Coyanca, and was described by his collaborator Kunth, under the name of *Bletia speciosa*. A quarter of a century later, La Llave and Lexarza found it in various parts of the province of Michoacan, the last-named botanist describing it in his *Orchidanum Opusculum*, under the name of *Bletia grandiflora*, probably failing to identify it with Humboldt's plant. Both of these specific names, therefore, have

* Quatro libros de la Naturaleza de las Plantas y Animales de Nueva España. Mexico, A.D. 1615.

precedence of Dr. Lindley's *majalis*, which was not given till 1839, when a plant in the collection of Mr. Llewelyn, at Penllergare, near Swansea, one of the first that flowered in this country, was submitted to him for naming, and which he called *Lælia majalis*, believing it to be new to science.* Plants had been introduced two years previously, by Mr. Barker of Birmingham, through his collector Ross, and by the Horticultural Society of London, through Hartweg.

Lælia majalis is widely distributed over southern Mexico; besides the localities named above, Ross found it in the neighbourhood of Oaxaca; Hartweg at San Bartolo, in a situation so elevated that the temperature sometimes falls below the freezing point; and Ghiesbrecht in the Morelia district (Guerrero), "growing on oaks, and especially in places where the wind is constantly blowing." It is called by the natives, *Flor de Mayo*, or May flower, in allusion to its time of flowering, and of which Lindley's *majalis* is simply the Latin rendering.

L. monophylla.

"Rhizome forming a branched matted mass, sending up tufts of leafing and flowering stems, 6—10 inches high, clothed with long appressed sheaths, speckled with pink. Leaf solitary, 2—3 inches long, narrowly linear-oblong. Scape slender, longer than the leaf, one-flowered. Flower 1—2 inches in diameter, vivid orange-scarlet, except the purple anther cap; sepals and petals similar, spreading, oblong, sub-acute; lip very small, embracing the column; terminal lobe minute, spreading, papillose on the disc. Column with the dorsal margin of the clinandrum crenulate."—*Botanical Magazine*.

Lælia monophylla, N. E. Brown in *Gard. Chron.* XVIII. (1882), p. 782. *Bot. Mag.* t. 6683. *Trigonidium monophyllum*, Griseb. *Fl. Brit. W. Ind.* p. 629. *Octadesmia*, Benth. in *Gen. Plant.* III. p. 526.

This is a bright scarlet *Lælia*, very unlike most of its congeners, which has quite recently been brought under the notice of orchid amateurs, first by Mr. N. E. Brown, in the *Gardeners' Chronicle*, and shortly afterwards by Sir J. D. Hooker, in the *Botanical Magazine*, where is figured a plant that flowered in the Royal Gardens at Kew, in the autumn of 1882. It has, however, been long known to science, having been discovered more than half a century ago on St. Andrew's mountain, in Jamaica, by the late Dr. Bancroft, by whom it was communicated to Sir W. J. Hooker. It was re-discovered in 1881 by Mr. D. Morris, Assistant-Director of the

* Reichenbach adopts Lexarza's name, but with hesitation; the identification of Humboldt's plant is altogether doubtful. *Xen. Orch.* II. p. 56.

Royal Gardens at Kew, and also by Mr. George Syme, late Superintendent of the Botanic Gardens in Jamaica, on St. Andrew's mountains at elevations of 3,500—5,000 feet above the level of the sea, growing on the stems and lower branches of trees.* It is an interesting species, in a geographical sense, being the only *Laelia* yet known that is not found on the American continent.

L. Perrinii.

Stems clavate, 6—9 inches high, attenuated below, compressed, monophyllous. Leaves oblong, obtuse or emarginate, as long as the stems, very leathery, spotted on the under side with brownish purple. Peduncles shorter than the leaves, few-flowered. Flowers with segments spreading horizontally, 5 inches in diameter; sepals and petals ligulate, acute, pale rose-purple, the lateral sepals falcate, the petals a little broader and undulate; lip obscurely three-lobed; the lateral lobes convolute over the column, and coloured externally like the sepals and petals; the intermediate lobe oblong, sub-acute with erose margin, reflexed, of a rich purple that is continued along the anterior margin of the side lobes; disc straw-yellow. Column trigonal, arching, white stained with purple.

Laelia Perrinii, Lindl. in Bot. Reg. 1842, sub. t. 62. Paxt. Mag. Bot. XIII. p. 5 (1847). Williams' Orch. Alb. II. t. 60. *Cattleya Perrinii*, Bot. Reg. 1838, t. 2. *C. intermedia angustifolia*, Bot. Mag. t. 3711. *Bletia Perrinii*, Rchb. Xen. Orch. II. p. 49.

Sub-var. — *nivea* (Gard. Chron. XIII. (1880), p. 264; Fl. Mag. n. s. t. 429; Williams' Orch. Alb. IV. t. 181), sepals, petals, and side lobes of lip white, anterior lobe pale rose-purple, disc pale yellow.

The date of the first introduction of this fine old *Laelia* does not appear to have been recorded. Dr. Lindley, who described it in the *Botanical Register* for 1838, states that he had then known it several years, and that it had been introduced from Rio de Janeiro by Mr. Harrison, of Liverpool, after whose gardener it is named; its habitat is said to be on the northern slopes of the Organ mountains, not far from Novo Friborgo. The sub-variety *nivea* first appeared many years ago in the collection of Consul Schiller, at Hamburg;† it is now in cultivation in several British collections. *Laelia Perrinii* flowers in October and November.

L. pumila.

Stems from a creeping rhizome, terete, 2—3 inches long, monophyllous. Leaves elliptic-oblong, as long as the stems. Peduncles shorter

* Bot. Mag. sub. t. 6683. "The mean annual temperature at this elevation is about 18° C. (65° F.); the plants are generally found on smooth perpendicular stems, 10—12 feet from the ground."—J. Hart in Gard. Chron. XXIV. (1885), p. 457.

† *Fide* Reichenbach, Gard. Chron. loc. cit. supra.

than the leaves, one-flowered. Flowers 3—4 inches in diameter; sepals oblong, acute, rose-purple; petals ovate-oblong, as broad again as the sepals, but coloured like them; lip three-lobed, the lateral lobes rolled over the column and meeting at the edges, coloured externally like the sepals and petals, with the addition of a broad purple blotch at the anterior edge; middle lobe oblong, bilobate with erose margin, maroon-



Lælia pumila.

purple, with a pale triangular blotch at the apex,* the central area traversed by 3—5 parallel yellow ridges, the middle one longer than the others, and dilated at its anterior extremity. Column clavate, triquetral, white.

Lælia pumila, Rchb. in Van Houtte's *Fl. des Serres* IX. (1853), p. 102. Warner's *Sel. Orch.* II. t. 32 (1865—75). *Belg. hort.* 1878, p. 279. *L. præstans*, *Bot. Mag.* t. 5498. † *Cattleya pumila*, Hook. *Bot. Mag.* t. 3656 (1839). *Bot. Reg.* 1844, t. 5. *C. marginata*, Paxt. *Mag. Bot.* X. p. 265 (1843). *The Florist*, 1850, t. 34. *C. spectabilis*, Paxt. *Fl. Gard.* I. p. 44 (1851). *C. Pinelii*, Lindl. in *Bot. Reg.* 1844, sub. t. 5. *The Florist*, 1851, t. 44. *Bletia pumila*, Rchb. *Xen. Orch.* II. p. 44.

* This character is not constant.

† The plate is that of *L. pumila*, the description that of the variety *præstans*.

var.—*Dayana*.

Flowers usually a little deeper in colour, and appearing earlier than those of the type; the disc of the labellum white, with 5—7 raised parallel purple lines, with shorter radial ones on each side; the anterior margin of the side lobes and middle lobe deep purple.

L. pumila Dayana, *Fl. Mag.* 1877, t. 249. *L. Dayana*, Rehb. in *Gard. Chron.* VI. (1876), p. 772. Williams' *Orch. Alb.* III. t. 132.

var.—*præstans*.

Lip trumpet-shaped and not straight as in the type, convolute side lobes overlapping at their margin, very stiff in texture, so that they cannot be spread out without splitting; lines of the disc almost obsolete, disc orange-yellow.

L. pumila præstans, supra. *L. præstans*, Rehb. in *Berl. Allg. Gartenzeit.* 1857, p. 336. Van Houtte's *Fl. des Serres* XVIII. t. 1900 (1869—70). *Cattleya pumila major*, *Illus. hort.* 1859, t. 193. *Bletia præstans*, Rehb. *Xen. Orch. II.* p. 43, t. 114.

Lælia pumila first became known to science and to horticulture through Mr. John Allcard, who had received it from Essequibo, in British Guiana, and in whose collection it flowered for the first time in 1838; he sent a drawing of the plant to Sir William Hooker, which was reproduced in the *Botanical Magazine*, and from which it was partially described under the name of *Cattleya pumila*. British Guiana is not, however, its native country, but a region in southern Brazil, extending from the eastern part of the province of Rio de Janeiro southwards to Santa Catherina, where it grows upon trees on the mountain slopes at 1,500—2,500 feet elevation; its first discoverer is believed to be Dr. Gardner, who met with it while botanically exploring parts of the region (1836—41). It was shortly afterwards introduced into France by M. Pinel, a French merchant, who had settled in Brazil, and who sent plants, in 1842, under the name of *Cattleya marginata*, to M. Morel, an amateur of orchids, at Paris.* In the same or following year Messrs. Loddiges, of Hackney, imported a considerable number of plants, and since that time it has been uninterruptedly cultivated in most of the principal orchid collections in Europe. The variety *Dayana* was discovered by Boxall, in 1876, while collecting orchids in Brazil, for Messrs. Low and Co.; it is appropriately dedicated to the veteran orchidologist Mr. John Day, in whose collection, at Tottenham, it flowered for the first time in this country, in December, 1876. The variety *præstans* was originally brought from Santa Catherina†; it has always been a rare plant in cultivation. *Lælia*

* *Illus. hort.* 1859, sub. t. 193.

† *Xen. Orch. II.* p. 43.

pumila usually flowers in September and October, the variety *Dayana* a few weeks earlier. The specific name refers to the small size of the plants.

Cultural Note.—Like the other dwarf-growing Cattleyas and Lælias, *L. pumila* and its varieties are best cultivated in shallow pans that can be suspended near the roof glass, where they can receive a maximum of light, and in a position where there is a considerable range of temperature between the opposite seasons of the year. The small quantity of compost sufficient for the plants to root in must at no time be allowed to get dry, and during the growing season water must be liberally supplied; the higher temperature should then be maintained, taking care not to let it sink below 13° C. (55° F.). This treatment is evidently consonant, as far as practicable, with the climatic conditions of the comparatively high latitude from which this Orchid is brought, and the altitude at which it grows in its native country.

L. purpurata.

Stems spindle-shaped, compressed, smooth, and invested with a membranous, deciduous sheath when young, ribbed and channelled when old, monophyllous. Leaves oblong-ligulate, 12—15 inches long, very coriaceous. Peduncles robust, emerging from a leathery oblong, compressed sheath, 3—7 or more flowered. Flowers 6—8 inches in diameter; sepals oblong-lanceolate, acute, white, or white tinted and veined with pale amethyst-purple, but sometimes pale amethyst-purple with deeper veins; petals ovate-oblong, undulate, as broad again as the sepals and coloured like them, the colour being somewhat more developed; lip rhomboidal when spread out, obscurely three-lobed, the basal part with entire margin, rolled over the column into a tube, externally whitish, on the inner side pale yellow marked with purple lines, of which the three central are parallel, the others divergent; the anterior part spreading with crisped margin, of the richest purple veined with maroon-purple. Column clavate, triquetral, bent, greenish.

Lelia purpurata, Lindl. in Paxt. *Fl. Gar.* III. t. 96 (1852-53). Illus. hort. I. (1854), p. 54, cum ic. xyl. *Id.* III. (1856), t. 83. Van Houtte's *Fl. des Serres* XI. (1856), t. 1138. Linden's *Pesc.* t. 37. Warner's *Sel. Orch.* I. t. 40. Jennings' *Orch.* t. 22. Cattleya Brysiana, Lemaire Gard. *Fleur.* III. p. 275. *Bletia purpurata*, Rehb. *Xen. Orch.* II. p. 52.

Sub-vars.—*Baron Schroeder's** (Williams' *Orch. Alb.* I. t. 2.; Gard. Chron. XXIII. (1885), p. 785), sepals and petals pure white; inner surface of tube of lip pale ochreous yellow, with radiating lines of deep purple, anterior lobe mauve-purple bordered with white.; *M. Brys'*, sepals and petals flushed with pale rose-purple, anterior lobe deep purple.; *M. Neli's†*

* This is quite distinct from the Lelia figured in *L'Illustration Horticole* 1857, t. 134, as *L. Brysiana*, which is one of the forms of *L. elegans*.

† Not seen by us.

Iaelia purpurea.



(*Illus. hort.* 1868, t. 569), sepals and petals pale rose with deeper veins and reticulations, anterior part of lip deep crimson-purple; *Provost Russel's* (Williams' *Orch. Alb.* VI. t. 269), sepals and petals white tinted with pale lilac-purple, the veins of a deeper colour, anterior lobe of lip soft rosy lilac, with deeper veins and reticulations; *Williams'* (*Orch. Alb.* I. t. 9—10), sepals and petals rosy lilac veined with amethyst-purple, tube of lip white, except at the anterior edge where it is deep purple like the spreading middle lobe.

First discovered in 1847 in the province of Santa Catherina, in southern Brazil, by François Devos, who sent plants to M. Verschaffelt's horticultural establishment at Ghent, in Belgium, whence they were distributed among the orchid collections of Great Britain and the Continent.* It flowered for the first time in this country, in Messrs. Backhouse's nurseries at York; its usual flowering season is June and July. Besides the colour or sub-varieties described above, many others have received distinguishing names, as *Aurora*, *bella*, *prætexta*, *superba*, etc.



Laelia rubescens.

L. rubescens.

Pseudo-bulbs ovoid, compressed, 1—2 inches long, bearing at their apex a solitary, oblong-lanceolate, coriaceous leaf, about 4 inches long. Scapes slender, 8—12 inches high, jointed, with a closely adherent pointed bract at each joint, and bearing at their summit a loose raceme of 4—7 flowers. Flowers $2\frac{1}{2}$ inches in diameter, varying in colour from rosy lilac to pure white, with a maroon spot towards the base of

* According to Linden's *Pescatorea*, sub. t. 37, *Laelia purpurata* was first introduced direct from Brazil by M. Brys, of Bornhem, near Antwerp, whence it obtained the name of *Cattleya Brysiana*. The editor of *L'Illustration Horticole*, however, strenuously affirms (1885, p. 54), that Mr. Verschaffelt was the original introducer of it through Devos.

the lip, in front of which is a yellowish stain; sepals linear-oblong, acute; petals ovate-oblong; lip three-lobed, the lateral lobes roundish, convolute over the column, the intermediate lobe oval-oblong, reflexed with 2-4 raised lines on its disc. Column clavate, short.

Laelia rubescens, Lindl. *Bot. Reg.* 1840, t. 41. Van Houtte's *Fl. des Serres*, VII. t. 742 (1851). *L. acuminata*, Lindl. *Bot. Reg.* 1841, t. 24. *Part. Mag. Bot. X.* p. 49 (1843). Van Houtte's *Fl. des Serres*, I. p. 23 (1845). *Bot. Mag.* t. 4905 (1856). *L. peduncularis*, Lindl. *Bot. Reg.* 1842, misc. 10. *Id.* 1845, t. 69. *Bot. Mag.* t. 4099. Williams' *Orch. Alb.* IV. t. 163. *Bletia rubescens*. Rchb. *Xen. Orch.* II. p. 53.

Sub-vars.—*alba*, flowers white, except a yellow stain on the lip; *rosea* or *peduncularis supra*, flowers rosy mauve with the maroon blotch on the lip as in the type.

This *Laelia* was first brought under the notice of Dr. Lindley, in 1840, by Mr. Barker, of Birmingham, who had purchased a plant some time previously of Mr. Joseph Knight, one of our predecessors at this nursery, who gave no intimation of its habitat. It was however, rediscovered by Hartweg in the same year at a place called Retatulen, in Guatemala, growing on a Calabash tree (*Crescentia Cujete*), a tree to which the Orchidæ seem to have a special aptitude for affixing themselves, owing doubtless to the facilities afforded by its long horizontal branches for resting places for the minute seeds.* The species is somewhat sparingly spread over parts of southern Mexico and Guatemala; it is so highly thought of by the inhabitants of the last-named country that they call it the *Flor de Jesus*; its flowering season is November and December.

L. superbiens.

Pseudo-bulbs from a creeping rhizome as thick as a man's finger, fusiform, prominently angulate and furrowed when old, a foot or more in length, diphyllous. Leaves elliptic-oblong, as long as the pseudo-bulbs, leathery, and deep green. Peduncles 4-6 feet long, jointed, with a large adherent membranous sheath at each joint. Flowers 5 inches in diameter, clustered at the extremity of the scape, on pedicels 3 inches long; sepals and petals similar, lanceolate, acute, rosy mauve, paler at the base; lip shorter than the other segments, oblong, three-lobed, the lateral lobes convolute over the column, yellow streaked with purple on the inner side; the middle lobe depressed, bright rosy purple with deep purple veins; disc yellow with five serrated lamellæ. Column arched, triquetral, dull purple, anther cap white.

Laelia superbiens, Lindl. *Bot. Reg.* 1840, misc. 87. *Batem. Orch. Mex. et. Guat.* t. 38 (1843). *Part. Mag. Bot. XI.* p. 97 (1844). *Bot. Mag.* t. 4090. Hook.

* Sir William Hooker states (*Bot. Mag.* sub. t. 3430, year 1835), that branches of the Calabash tree were not infrequently sent to England from the West India Islands for the sake of the epiphytes with which they were invested, and these being fixed in the earth readily vegetated.

Cent. Orch. t. 23. Van Houtte's *Fl. des Serres*, t. 1178—79. Warner's *Sel. Orch.* I. t. 20. Williams' *Orch. Alb.* VI. t. 244. *Bletia superbiens*, Rchb. *Xen. Orch.* II. p. 46.

One of the discoveries of Mr. G. Ure Skinner, in Guatemala, who gave Mr. Bateman the following account of it:—

"I first found *Laelia superbiens* in the village of Sumpango, planted by the Indians in front of their doors. This was in 1839; afterwards, in November, 1840, I went in search of its true habitat, and after an excursion of three days, found it in the barrancas of Sachumarachon,* near the town of Comalapa,* about 20 leagues due north of the city of Guatemala. Here it exists in immense quantities, the finest specimens growing out of the rocks, and sheltered from the north wind. Some of the plants had bulbs of the height of 22 inches with flower stems 4 yards in length, and bearing upwards of twenty flowers. On the morning on which I made this excursion, the ground was covered with hoar-frost; the Lælias, however, were usually screened from the north, and when this was not the case, the plants had a stunted appearance. The name given to this species, by the Indians who speak Spanish, is *La rara del Señor San José*, that is, the wand of St. Joseph."†

It was introduced, in 1842, by the Horticultural Society of London, through Hartweg; it flowered for the first time in this country in the collection of Mrs. Wray, at Oakfield, near Cheltenham, in February, 1844. As a species in its botanical aspect, *Laelia superbiens* stands on the verge of the genus, approaching so closely the Schomburgkias, of which it has altogether the habit, that its systematic place would seem to be rather with them than with the Lælias; in fact, Reichenbach, in merging the Lælias into Bletia, in his systematic arrangement of the Orchidæ, brought the Schomburgkias also under the same genus.

L. *xanthina*.

Stems clavate, compressed, 6—8 inches long, monophyllous. Leaves oblong, obtuse, as long as the stems. Peduncles issuing from a compressed purplish, sometimes pale green sheath, 3—5 flowered. Flowers $2\frac{1}{2}$ — $3\frac{1}{2}$ inches in diameter, buff-yellow, except the anterior lobe of the lip, which is white streaked with crimson-purple; sepals and petals similar and subequal, elliptic-oblong with reflexed margins; lip subquadrate, obscurely three-lobed, the lateral lobes erect, the intermediate lobe acuminate, reflexed at the apex. Column subtriquetral, streaked with red on the anterior face.

Laelia xanthina, Lindl. *Bot. Mag.* t. 5144 (1859). Van Houtte's *Fl. des Serres*, t. 2418 (1880). Williams' *Orch. Alb.* I. t. 23. *Bletia xanthina*, Rchb. *Xen. Orch.* II. p. 51.

Introduced, in 1858, by Messrs. Backhouse, of York, from Brazil (conjecturally from Bahia). Its nearest affinity is *L. grandis*, to which

* These places are not shown on modern maps.

† Batem. *Orch. Mex. et Guat.* sub. t. 38.

it is inferior in the size of its flowers and in their coloration; it is, nevertheless, worthy of cultivation. The specific name, from ξανθός (xanthos), "yellow," refers to the colour of the flowers.

HYBRID CATTLEYAS AND LÆLIAS.

Besides the Cattleyas and Lælias described in the preceding pages, a considerable number of others of hybrid origin have, of late years, been introduced into cultivation; these may be conveniently brought under two heads:—

- I. SUPPOSED NATURAL HYBRIDS, originating in the cross fertilisation of recognised species by insect agency in their native country, whence they have been imported with one or other of the species from which they are supposed to have been derived.*
- II. GARDEN HYBRIDS, obtained in the glass houses of Europe, chiefly in our own establishment, by the artificial fertilisation of one species with the pollen of another.

In both sections, the vegetative organs of the progeny, pseudobulbs, leaves, etc., have taken a form intermediate between those of the two parents, not always occupying in this respect the exact middle position between them, but frequently resembling one parent more than the other. In those cases in which a monophyllous Cattleya or Lælia is one parent, and a diphyllous species the other, some of the stems of the offspring have but one leaf and others two, there being apparently no law followed, for both kinds are fertile as soon as the plants are of sufficient strength to produce flowers. And so with the flowers; as regards size and form, they invariably take an intermediate place between the two parents, although particular organs are sometimes found to resemble the same organs of one parent much closer than they do those of the other.

The natural hybrids of Cattleya and Lælia believed to have been derived from any pair of species, as well even as in the aggregate, are limited in numbers. In the case of every such natural hybrid that we know of, the number of plants that have appeared among the species with which it has been imported, has been extremely restricted, and in many instances, if not the majority, confined to one only. This extreme paucity of individuals derived from one cross, occurs in like manner

* We have included among the recognised species such supposed natural hybrids as *Cattleya Schilleriana*, *Lælia Dormaniana*, and *L. elegans*, which have been imported in considerable numbers from their native country.

among those raised by hand, the causes of which have been already discussed by us in another place.* Hence, unlike the Odontoglotis, among which natural hybrids are so plentiful, that in certain cases they can be recognised as "confluent in series," and ranged as varieties under the species they most nearly resemble,† the hybrid Cattleyas and Lælias derived from any pair of species stand out too distinct from each to admit of being brought as varieties under either.

Artificially raised hybrid Cattleyas and Lælias have a special interest for horticulturists, chiefly on account of the difficulties attending the raising of them, and the length of time that elapses before the seedlings attain the flowering stage. The following particulars relating to them derived from our own experiments in hybridisation will be read with interest. Among Cattleyas, all the forms of the *labiata* group upon which experiments have been made, and also the Brazilian species with two-leaved stems, cross freely with each other, and with the Brazilian Lælias, which also cross freely with each other. But none of the Cattleyas, nor even the Brazilian Lælias will cross freely with the Mexican Lælias, *albida*, *autumnalis*, *majalis*, *rubescens*, &c. Numerous crosses have been effected both ways, and capsules have been produced, but the seed has always proved barren. *Lelia anceps* is, so far, an apparent exception, for it seeds freely, whether fertilised with the pollen of a Cattleya, or of a Brazilian Lælia. The period from the germination of the seed to the appearance of the first flower varies immensely in the different crosses, thus—*Lelia triophthalma* raised from seed sown in 1875, flowered in 1883; this is the shortest period known to us; *Lelia calloglossa* from seed sown in 1858, flowered for the first time in 1877, or nineteen years; this is the longest period known; the others raised by us have taken periods that may be said to average from ten to twelve years. The first hybrid Cattleya that flowered was *C. hybrida*, a plant now lost, but which was soon followed by the flowering of *C. Brabantie*: these were raised at Exeter, as were *Cattleya Dominiciana*, and *Lelia exoniensis*. *Cattleya Marstersonia*, *Lelia flammæa*, *L. bella*, *L. Amesiana*, *L. callistoglossa* are among the most brilliant forms raised at Chelsea. *Sophrocattleya (Lelia) Batemaniana*, also raised at Chelsea, is a hybrid of especial interest, in a scientific as well as in a horticultural point of view, the particulars of which are given with the description of the plant itself.

The descriptions which follow are confined chiefly to the colours of the different parts of the flower, with such few additional details as are likely to afford a help to identification. In denoting the parentage of the Garden Hybrids, we have followed the horticultural practice of placing the seed-producing one first.

* See paper on "The Hybridisation of Orchids," read by Mr. H. J. Veitch, before the Orchid Conference at South Kensington, in May, 1885, and published in the Journal of the Royal Horticultural Society, vol. vii.

† See *Odontoglossum*, p. 5.

SUPPOSED NATURAL HYBRIDS.

Cattleya Brymeriana.*

Sepals and petals rosy purple, striated with white; side lobes of lip deeper, yellowish below, and bordered in front with mauve-purple; anterior lobe deep purple, disc orange-yellow, prolonged in a broad band to the base of the lip.

Cattleya Brymeriana, Rehb. in *Gard. Chron.* XX. (1883), p. 492. Williams' *Orch. Alb.* IV. t. 184.

A supposed natural hybrid between *Cattleya superba* and *C. labiata El Dorado*, introduced by Messrs. Low and Co., through their collector White; it is dedicated to Mr. W. E. Brymer, of Ilswinton House, near Dorchester.

C. guatemalensis.

Sepals and petals pale rose-purple toned with orange; side lobes of lip pale orange externally, anterior lobe deep purple, disc orange-yellow spotted with red.

Cattleya guatemalensis, *Fl. Mag.* I. t. 61 (1861).

Sent to us from Guatemala by Mr. G. Ure Skinner, who found it growing in company with *Cattleya Skinneri* and *Epidendrum aurantiacum* on the stem of the same tree, whence it was supposed to be a natural hybrid between them. The plant has long since disappeared from cultivation.

C. Hardyana.

Flowers among the largest and most richly coloured of the *labiata* group; sepals and petals bright rose-purple, paler at the base; side lobes of lip magenta-purple, as is the much crisped anterior lobe, the colour being continued into the throat, where it is veined and reticulated with golden yellow, the yellow spreading laterally into two large blotches.

Cattleya Hardyana, Williams' *Orch. Alb.* V. t. 231.

A supposed variety hybrid between *C. labiata Dowiana aurea* and *C. labiata Warscewiczii (Gigas)*, said to have been imported with the latter. It recently appeared in the collection of Mr. G. Hardy, at Pickering Lodge, Timperley, after whom it is named, and still later in two or three other collections. It is one of the grandest Cattleyas known.

C. Measuresii.*

Flowers as large as those of *C. Aclandiae*; sepals and petals self-coloured, reddish brown; lip pale rose, column rose passing to purple at the apex.

Cattleya Measuresii, Rehb. *Gard. Chron.* XXVI. (1886), p. 526.

A supposed hybrid between *C. Aclandiae* and *C. Walkeriana*, in cultivation in the collection of Mr. R. H. Measures, at the Woodlands, Streatham.

C. resplendens.*

Sepals and petals dull olive-brown sparingly spotted with purple; lip white spotted and striated with amethyst-purple.

Cattleya resplendens, Rehb. in *Gard. Chron.* XXIII. (1885), p. 692.

A supposed hybrid between *C. guttata* and *C. Schilleriana*, recently introduced by Messrs. Low and Co.

* This, and all that follow similarly marked, not seen by us.

C. scita.*

Sepals and petals pale ochreous yellow, with some marginal pale purple stains and some small blotches scattered over the middle area; side lobes of lip pale yellow bordered with purple at the anterior edge; middle lobe purple.

Cattleya scita, Rchb. in *Gard. Chron.* XXIV. (1885), p. 489.

A supposed hybrid between *C. guttata* and *C. intermedia*, recently imported by Mr. B. S. Williams with the last named.

C. Sororia.*

Flowers as large as those of *C. Loddigesii*; sepals pale rose with greenish yellow tips; petals similar with numerous dark spots; lip white with pale purple margin and purple spots and markings. Column white, marked with purple.†

Cattleya Sororia, Rchb. in *Gard. Chron.* I. 3, s. (1887), p. 40.

A supposed hybrid, introduced from Brazil, by Mr. B. S. Williams, of which the parentage is uncertain. Professor Reichenbach suggests *C. Walkeriana* and *C. guttata*.

C. velutina.

Flowers 3—4 inches in diameter, with a pleasant violet fragrance; sepals and petals tawny yellow, spotted with maroon-purple; side lobes of lip whitish streaked with purple at their base on the inner side; middle lobe white with an orange-yellow blotch at the base from which purple lines radiate to the margin where the white ground changes to pale yellow.

Cattleya velutina, Rchb. in *Gard. Chron.* 1870, pp. 140, 1373. Id. 1872, p. 1259. Williams' *Orch. Alb.* I, t. 26.

A supposed hybrid of whose origin various hypotheses have been advanced, but that which ascribes its parentage to *C. bicolor* and one of the *C. guttata* forms with which it has been imported, appears to be supported by the best evidence. It flowered for the first time in this country in 1870, in the collection of Mr. Joseph Broom, at Didsbury, near Manchester, who had received it among other orchids from Rio de Janeiro; it has since appeared in several other collections.‡

C. Whitei.*

Flowers medium sized; sepals deep rose tinged with olive-green towards the tips; petals broader and more richly coloured; convolute lobes of lip pale rose towards the base, tinted with magenta-purple at the tips; anterior lobe magenta-purple with deeper veins and paler margin; disc yellow streaked with red-purple.

Cattleya Whitei, Rchb. in *Gard. Chron.* XVIII. (1882), p. 586. Williams' *Orch. Alb.* III. t. 115.

† It is impossible to convey to the reader a just notion of the colour of this *Cattleya* from the description given in the place quoted.

‡ Recent importations of this *Cattleya* from Brazil prove that it exists in numbers much less restricted than is usually the case with supposed hybrids; it may, therefore, hereafter receive specific rank.

Sent to Messrs. Low and Co., from Brazil, by their collector, White, who is said to have found it growing on a tree in company with *C. labiata*(?) and *C. Schilleriana*(?). The only plant known is in the collection of Mr. Holbrook Gaskell, at Woolton Wood, near Liverpool.

C. Isabella (Rehb. in Gard. Chron. XXIV. (1885), p. 456); *C. Lucieniana*, (Idem.); *C. Wilsoniana* (Rehb. Id. VIII. (1877), p. 72), are unknown to us except from the notices of them in the places quoted.

Laelia amanda.

Flowers 4 inches in diameter; sepals and petals pale rose-purple; lateral lobes of lip similarly coloured externally, on the inner side yellowish with radiating reddish streaks, and with an amethyst-purple blotch at the anterior margin; intermediate lobe amethyst-purple with deeper veins. Column white stained with purple.

Laelia amanda, Rehb. in Gard. Chron. XVIII. (1882), p. 776. *Cattleya Rothschildiana*, Hort.

A Laelia of Brazilian origin, introduced by Mr. William Bull; it is a supposed natural hybrid, the unequal pollinia suggesting a Cattleya, probably *C. intermedia* as one parent, the other, with equal probability, being *Laelia crispa* or *L. lobata*.

L. Crawshayana.*

Flowers two or more, produced at the extremity of a long peduncle, like that of *L. anceps*, but thinner; sepals and petals rose-purple; side lobes of lip similarly coloured with the tips deep purple; anterior lobe also deep purple, with the middle line of the disc yellow.

Laelia Crawshayana, Rehb. in Gard. Chron. XIX. (1883), p. 142.

A supposed hybrid between *Laelia anceps* and *L. autumnalis* or *L. albida*, dedicated to Mr. De B. Crawshay, of Rosefield, Sevenoaks.

L. eupatha.*

Plant of robust habit like *L. purpurata*; sepals and petals white delicately tinted with pale rose-purple; side lobes of lip whitish externally, the central area between them on the inner side yellow, traversed longitudinally by 5-7 red-purple lines; anterior-lobe deep purple, paler towards the margin, where it is rayed and striated by the deeper colour.

Laelia eupatha, Rehb. in Hamb. Gartenz. 1864, p. 420. Sander's Reich. I. t. 8.

A supposed hybrid between *Laelia purpurata* and *Cattleya intermedia*, and thence of similar origin as *Laelia elegans*, to some of the forms of which the flowers bear some resemblance. As represented in *Reichenbachia*, *Laelia eupatha* so much resembles *Laelia purpurata*, that it might be regarded as a variety of that species. It first appeared in a private collection in Berlin, in 1860, and has recently been introduced into this country from Brazil, by Messrs. Sander and Co.

L. Leeana.*

Plant dwarf, with stems like those of *Laelia pumila*, but longer, and bearing larger leaves; sepals and petals narrow, stellate, rose-purple, side

lobes of lip pale rose, with a purple blotch at the tip of each; anterior lobe magenta-purple.

Lælia Leeana, Rehb. in Gard. Chron. XVII. (1882), p. 492.

A supposed hybrid of Brazilian origin, but of uncertain parentage, in the collection of Mr. Lee, at Downside, to whom it is dedicated.

L. *lilacina*.

Peduncle two or more flowered; sepals and petals pale lilac; side lobes of lip white externally, marked with purple lines on the inner side; anterior lobe white with a rayed purple blotch on the disc.

Lælia lilacina, Hort. Philbrick.

A supposed hybrid between *Lælia crispa* and *L. Perrinii*, the same two species from which Dominy raised *L. Pilcheri*. The natural hybrid differs from the artificially raised one chiefly in the form of the labellum, and in the season of flowering. *L. lilacina* was exhibited by Mr. Philbrick, Q.C., at the meeting of the Royal Horticultural Society, at South Kensington, March 9th, 1886.

L. *porphyritis*.

Sepals pale greenish purple; petals a little broader, pale purple, as are the side lobes of the lip, but deeper at the tips; anterior lobe rich purple with a yellowish white disc. Column white with the angular margins purple.

Lælia porphyritis, Rehb. in Gard. Chron. XXV. (1886), p. 73.

A supposed hybrid, brought by Mr. Day from Brazil in the autumn of 1884, of which the presumed parents are *Lælia pumila* and *L. dormaniana*.

L. *Wyattiana**.

Sepals and petals white; side lobes of lip pale yellow externally, anterior lobe pale purple with deep purple venations. Column white spotted with purple.

Lælia Wyattiana, Rehb. in Gard. Chron. XX. (1883), p. 426.

A hybrid supposed to have been derived from *Lælia crispa* and *L. lobata*. It first appeared in the collection of Mr. G. Neville Wyatt, at Lake House, Cheltenham, to whom it is dedicated.

GARDEN HYBIDS.

Cattleya Brabantiae.

C. Loddigesii × *C. Aclandiae*.

Stems slender, peduncles usually two flowered; flowers 3 inches in diameter; sepals and petals pale rose-purple tinted with olive-green and spotted with deep purple; lateral lobes of lip whitish with pale purple veins; anterior lobe white veined with pale purple, and having a bright yellow blotch immediately in front of the column, which is rose-purple.

Cattleya Brabantiae, Fl. Mag. t. 360 (1887).

Raised by Dominy at our nursery, and named in compliment to the Duchess of Brabant, now Queen of the Belgians.

C. calummata.*C. intermedia* × *C. Aelandiae*.

Flowers 4 inches in diameter; sepals and petals nearly as in *C. Aelandiae*, yellowish white tinted with pale rose and spotted with amethyst-purple; side lobes of lip pale rose suffused with white, anterior lobe amethyst-purple.

Cattleya calummata, André in *Revue horticole*, 1883, p. 564. Williams' *Orch. Alb.* II⁷. t. 166.

Raised by M. Bleu, of Paris. The author of the name observes that one of the most prominent characteristics of this hybrid is seen in the form of the lip, which reminds one of a kind of head-dress sometimes worn by ladies, and which suggested to him the name, which is derived from the Greek word κάλυμμα (kalumma), "a hood."

C. Chamberlainiana.*C. guttata Leopoldii* × *C. labiata Dowiana*.

Peduncles 5—7 or more flowered, flowers 5 inches in diameter; sepals amethyst-purple toned with tawny yellow; petals broader with more purple than in the sepals; side lobes of lip amethyst-purple crossed with tawny yellow lines, anterior lobe rich amethyst-purple. Column white.

Cattleya Chamberlainiana, Rehb. in *Gard. Chron.* XVI. (1881), p. 427.

Raised by Seden at our nursery, and named in compliment to the Right Hon. Joseph Chamberlain. The colour of the sepals and petals is peculiar and even striking, being quite unlike that seen in any other *Cattleya* in cultivation.

C. Dominiana.*C. maxima* × *C. intermedia*.

Sepals and petals pale rosy lilac, the latter undulate; side lobes of lip whitish; intermediate lobe with crisped margin, pale amethyst-purple with deep purple veins, and with a pale citron-yellow disc traversed longitudinally by a purple line.

Cattleya Dominiana, Lindl. in *Gard. Chron.* 1859, p. 948. *Fl. Mag.* 1867, t. 367.

Raised by Dominy at the Exeter nursery. The flowers produced by the few seedlings raised from this cross agree in form, but differ slightly in colour; one with pale sepals and petals and white side lobes of lip is distinguished as *alba*, and another in which the yellow disc of the lip is enlarged, and of a deeper colour than the others is called *tutea*.

C. fausta.*C. Loddigesii* × *Laelia exoniensis* ×

Flowers 4 inches across, three or more on each peduncle; sepals and petals rosy lilac, as are the side lobes of the lip externally; anterior area of the middle lobe rose-purple, below which is a large orange-yellow blotch.

Cattleya fausta, Rehb. in *Gard. Chron.* 1873, p. 289. *Fl. Mag.* n. s. t. 189.

Raised by Seden at our nursery. As in the case of the preceding hybrid, the flowers produced by the seedlings differ in colour, and are thus distinguished, *aurea*, the yellow blotch on the lip greatly enlarged; *bella*, all the segments white, or nearly so, except the yellow blotch on the lip; *crispa*, the margin of the lip crisped as in the pollen parent; *delicata*, sepals and petals tinted with pale lilac, the anterior lobe of the lip shaded with rose.

C. Harrisii.

C. guttata Leopoldii × *C. labiata Mendelii*.

Flowers 5—6 inches in diameter; sepals and petals pale rose-purple sparingly dotted with amethyst-purple; side lobes of lip paler than the sepals and petals, with a large amethyst blotch at the acute apex; middle lobe with a jagged undulate margin and apical cleft, amethyst-purple. Column white with a few purple spots above.

Cattleya Harrisii, Rehb. in Gard. Chron. I. 3 s. (1887), p. 104.

Raised by the late Dr. Harris, of Lamberhurst, Kent. One of the handsomest and most distinct of its class.

C. hybrida picta.

C. guttata × *C. intermedia*.

Flowers as large as those of the pollen parent, 6—7 on each peduncle; sepals pale olive-green sparingly spotted with purple; petals similarly coloured with the addition of a broad margin of pale rosy mauve; lateral lobes of lip white externally; middle lobe purple with a paler margin and yellowish disc.

Cattleya hybrida picta, Fl. Mag. 1881, t. 473.

Raised by Dominy at the Exeter nursery.

C. Manglesii.

C. labiata Luddemanniana × *C. Loddigesii*.

Flowers 4—5 inches in diameter; sepals pale rose-purple with a few linear stains of a deeper shade; petals rose-purple, deeper in the centre, paler towards the margins; side lobes of lip coloured like the sepals, except at the anterior edge where they are white and crisped; middle lobe much crisped, white spotted with amethyst-purple, disc yellow with a prolongation into the tube, on each side of which is a purple blotch.

Cattleya Manglesii, Rehb. in Gard. Chron. XIV. (1880), p. 556.

Raised by Dominy at our nursery. The coloration of the lip is distinct.

C. Mardelli.

C. labiata Luddemanniana × *Laelia elegans*.

Flowers showy, 5 inches in diameter; sepals and petals spreading, rose-purple, the former narrow and smooth, the latter broad and wavy; side lobes of lip coloured like the sepals and petals; middle lobe magenta-purple; disc pale yellow with a deep yellow median band. Column streaked and stained with deep purple.

Cattleya Mardelli, Rehb. in Gard. Chron. XI (1879), p. 234. Id. XIII. (1880), p. 776. Fl. Mag. 1881, t. 437. Williams' Orch. Alb. VI. t. 287.

Raised by Seden at our nursery.

C. Marstersoniae.*C. Loddigesii* × *C. labiata vera*.

Flowers 4—5 inches in diameter; sepals and petals delicate pale rose-purple; side lobes of lip white externally, with a purple blotch at their tips on the inner side; middle lobe rich magenta-purple, continued downwards towards the base of the lip between two canary-yellow blotches that spread over the base of parts of the side lobes.

Cattleya Marstersoniae, Rehb. in Gard. Chron. X. (1878), p. 556.

Raised by Seden at our nursery. It is one of the first, and at the same time, one of the most beautiful of the series of hybrids obtained by crossing one of the *labiata* forms with other species of Cattleya.

C. Mitchelli.**C. guttata Leopoldi* × *C. labiata Trianae*, sub-var. *quadricolor*.

Flowers exceeding 4 inches in diameter; sepals and petals rose-purple; side lobes of lip paler; middle lobe deep purple; disc orange-yellow.

Cattleya Mitchelli, Rehb. in Gard. Chron. VI. (1876), p. 386. *Fl. Mag.* 1879, t. 337.

Raised by Mitchell, gardener to Dr. Ainsworth, of Lower Broughton, Manchester.

C. porphyrophlebia.*C. intermedia* × *C. superba*.

Flowers 4—5 inches in diameter; sepals and petals lilac suffused with white; side lobes of lip similarly coloured externally; anterior area of middle lobe rich amethyst-purple striated with pale purple, below which are two pale sulphur blotches separated by a purple band that extends to the base of the lip.

Cattleya porphyrophlebia, Rehb. in Gard. Chron. XXIV. (1885), p. 552.

Raised by Seden at our nursery. The rich purple veinings on the lip are remarkable, and suggested the name, which is from πορφύρα (porphura), "purple," and φλέψ φλεβός (phleps phlebos), "a vein."

C. suavior.*C. intermedia* × *C. labiata Mendelii*.

Sepals and petals pale rosy lilac suffused with white; side lobes of lip white tinted with pale lilac towards the margins; middle lobe with crisped margin and a deep sinus or cleft in the anterior margin, amethyst-purple; disc cream-white, below which a purple band extends to the base.

Cattleya suavior, Rehb. in lit.

Raised by Seden at our nursery.

Sophrocattleya Batemaniana.*Sophronitis grandiflora* × *Cattleya intermedia*.

Latest formed stems sub-cylindric or clavate, 3 inches high, diphyllous. Leaves ovate-oblong, 3 inches long, leathery, deep green. Peduncles 3—5 flowered. Flowers 3 inches in diameter; sepals broadly lanceolate, petals broader, ovate-oblong, both sepals and petals bright rose colour, toned with scarlet; lip very distinctly three-lobed, the side lobes roundish,

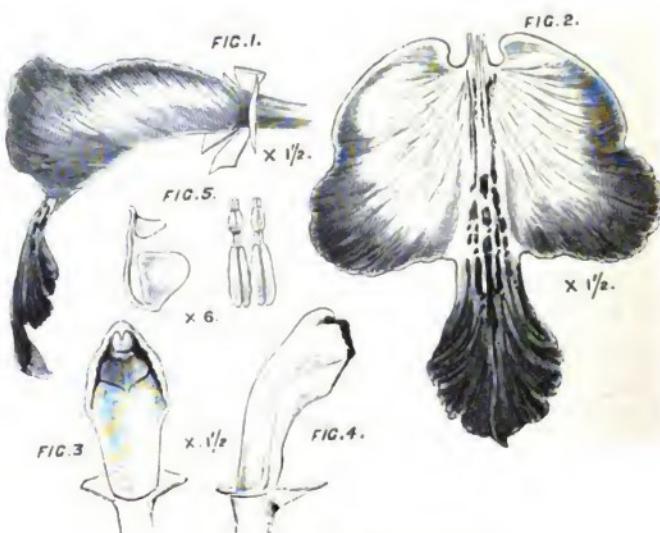
* Not seen by us.



Sophrocattleya Batemaniana.



Flower nat. size.



Sophrocattleya Batemaniana.

convolute over the column, slightly reflexed towards their apex, pale lilac externally, on the inner side cream-white bordered with amethyst-purple at the anterior margin; middle lobe broadly oval, undulate at the margin, crimson-purple. Column white stained with purple at the apex.

Sophrocattleya Batemaniana, *supra*. Rolfe in Jour. Linn. Soc. vol. XXIV, p. 266. Lelia Batemaniana, Rehb. in Gard. Chron. XXVI. (1886), p. 263.

Raised by Seden at our nursery. This is unquestionably the most remarkable hybrid orchid obtained up to the present time; it is alike interesting to botanists and to horticulturists; to the former, because it proves that "hybridisation may take place not only between distinct species, but also between distinct genera, or between plants so structurally different as to be regarded as such;" to the latter, because a new and distinct orchid of exceptional beauty has been brought into existence purely by the gardener's art and skill, and has thence supplied a stimulus to hybridisers to undertake further experiments. Both for botany and for horticulture its appearance has suggested the desirability of a special nomenclature to denote orchids that, like our present subject, are of purely artificial origin, and by which they may at once be recognised as such, and, at the same time, without interference with the scheme of classification generally accepted by botanists all over the world. On these grounds we prefer following the precedent set by Dr. Masters in the *Gardeners' Chronicle*, 1872, p. 358, when naming a bi generic hybrid raised by us from two plants belonging to another Natural Order, of compounding a name from that of the two parent genera, a plan that is also recommended by Mr. Rolfe of the Kew Herbarium. Further discussion here on the technical grounds for this course would encroach too much on our space; we must, therefore, refer the reader to the able paper in the Journal of the Linnean Society quoted above, and to the structural details of the flower that are given in the accompanying woodcut.* With respect to the plant itself we have only to add that the seed was sown in June, 1881, and the first flower expanded in the first week in August, 1886. A slight variation in the colour of the sepals and petals is observable in the very few seedlings that have flowered up to the present time, the scarlet of Sophronitis being more developed in one or two than in the others, while in one case it is scarcely perceptible; this sub-variety we have provisionally called *rosea*. This remarkable hybrid is dedicated to the veteran orchidologist, Mr. James Bateman, author of *Orchidaceæ of Mexico and Guatemala*, etc.

* Fig. 1, side view of lip; 2, lip spread out; 3, front, 4, side view of column; 5, pollinia as seen from above and laterally.

Lælia Amesiana.*Lælia crispa* × *Cattleya maxima*.

Flowers 5—6 inches in diameter; sepals white with a faint flush of amethyst-purple; petals much broader, undulate, white with a deeper flush of amethyst-purple; lateral lobes of lip white at the margin, changing to pale sulphur-yellow below; intermediate lobe rich purple, which is continued into the tube formed by the lateral lobes; margin crisped, whitish.

Lælia Amesiana, Rehb. in Gard. Chron. XXI. (1884), p. 109. Williams' *Orch. Alb. VI.* t. 253.

Raised by Seden at our nursery, and dedicated to the Hon. F. L. Ames, of North Easton, Massachusetts, one of the most liberal patrons of horticulture in America. It is one of the most beautiful hybrid Lælias yet obtained.

L. bella.*Lælia purpurata* × *Cattleya labiata vera*.

Sepals pale rose-purple suffused with white; petals undulate, more deeply coloured than the sepals; lateral lobes of lip amethyst-purple with deeper veins externally, paler on the inner side; intermediate lobe rich purple, which is continued round the anterior end of the side lobes; margin of intermediate lobe undulate, pale lilac.

Lælia bella, Rehb. in Gard. Chron. XXI. (1884), p. 174.

Raised by Seden at our nursery. This is a splendid acquisition, unsurpassed in attractiveness by any other hybrid Lælia.

L. callistoglossa.*Lælia purpurata* × *Cattleya labiata Warscewiczii (Gigas)*.

Sepals smooth, delicate pale rosy mauve suffused with white; petals undulate, broader and more deeply coloured; lateral lobes of lip rich purple, paler below and streaked obliquely with deep purple; intermediate lobe broad with undulate margin, of the richest purple shaded with maroon; disc and basal area between the side lobes pale yellow streaked with purple.

Lælia callistoglossa, Rehb. in Gard. Chron. XVII. (1882), p. 76. Williams' *Orch. Alb. V.* t. 235.

Raised by Seden at our nursery. The gorgeous lip of this hybrid, which suggested the distinguishing name, is scarcely equalled in colour by that of any of the species belonging to the grand race of orchids, from which it is derived.

L. caloglossa.*Cattleya labiata vera* × *Lælia crispa* or *L. lobata*.

Sepals, petals, and lateral lobes of lip pale rose-purple; intermediate lobe of lip deep purple bordered with white, and having two sulphur-yellow blotches on the disc.

Lælia caloglossa, Rehb. in Gard. Chron. VII. (1877), p. 202.

Raised by Dominy at our nursery.

Lælia callistoglossa.



L. Canhamiana.

Parentage not recorded, but supposed to be *Laelia purpurata* × *Cattleya labiata Mossiae*, or *vice versa*.

Sepals and petals white with a faint flush of pale rose-purple, the petals as broad again as the sepals; side lobes of lip stained with pale orange-yellow, anterior lobe of the richest purple, with a narrow white slightly crisped margin; disc orange-yellow, streaked with purple.

Laelia Canhamiana, Rehb. in Gard. Chron. XXIV. (1885), p. 6.

An *enfant trouvé*, named after Canham, one of the orchid foremen at the Royal Exotic Nursery.

L. Dominiana.

Flowers of the form and size of a Cattleya of the *labiata* group; sepals and petals amethyst-purple; lip nearly that of *C. labiata Dociana*, the side lobes coloured externally like the sepals and petals; the middle lobe large and spreading with crisped margin, of the richest velvety maroon-purple, with a golden yellow disc, heavily streaked with maroon-purple. Column white.

Laelia Dominiana, Rehb. in Gard. Chron. X. (1878), p. 332. *Fl. Mag.* n. s. t. 325.

L. Dominiana rosea.

Sepals and petals white, the latter faintly flushed with amethyst-purple on the distal half; side lobes of lip whitish externally, pale buff-yellow on the inner side, the central area of the lip also buff-yellow streaked with purple; middle lobe deep purple, paler at the margin.

L. Dominiana rosea, Hort.

Two beautiful seedlings, which originated in this nursery. There is much uncertainty about the actual parentage of these plants, and it may yet be proved that the first named will have to be relegated to Cattleya, as it had without question *C. labiata Dociana* for one parent, and the probability is great that *C. labiata Mossiae* was the other. As to the second, we surmise that *Laelia purpurata* was used. Be the parents what they may, both forms are exceedingly handsome and distinct from all other hybrids. We are not without hope that the numerous seedlings in our nursery that have not yet flowered, but whose parentages have been carefully registered, may eventually afford the means of determining the parentage, of both the above, and also of the splendid hybrid next described.

Both plants have passed into the collection of Baron Schroeder, at The Dell Staines.

L. exoniensis.

Owing to the irregularity with which crosses were registered in the early days of orchid hybridisation, the parentage of this beautiful hybrid is unfortunately involved in obscurity; two hypotheses have been suggested, viz.: *Cattleya labiata Mossiae* × *Laelia purpurata*, and

This combination was published in the
Supplement of 'Cattleya Exoniensis by Rehb.'
HYBRID LÆLIAS. in Gard. Chron.
1867, p. 1144.

L. crispa × *L. purpurata*; the results of more recent crossings of these species tend to strengthen the second supposition.

Flowers 5—6 inches in diameter; sepals and petals white, often delicately tinted with pale rosy mauve, the petals broader and more wavy than the sepals; side lobes of lip white externally, blotched with purple on the inner side near the anterior margin, which is crisped; middle lobe depressed, of the richest purple, with a narrow white or pale mauve crisped margin; disc yellow, streaked with purple.

Lælia exoniensis, supra. *Cattleya exoniensis*, Fl. Mag. 1863, t. 269. Rehb. in Gard. Chron. 1867, p. 1144. Jennings' Orch. t. 1. Warner's Sel. Orch. II. t. 36.

Raised by Dominy at the Exeter nursery. It was one of the earliest as well as one of the most successful of his efforts; ever since its first appearance, it has been universally acknowledged by orchid amateurs to be one of the most beautiful of the noble race to which it belongs.

L. felix.

Parentage uncertain, supposed to be *Lælia crispa* × *Cattleya Schilleriana*.

A dwarf plant; peduncles usually two flowered, flowers 4—5 inches in diameter; sepals and petals pale rosy mauve, the petals broader and more brightly coloured than the sepals; side lobes of lip cream-white externally; middle lobe purple veined and reticulated with maroon, and bordered with white; disc yellow streaked with purple.

Lælia felix, supra. *Cattleya felix*, Rehb. in Gard. Chron. VI. (1876), p. 68.

Raised by Dominy at our nursery.

L. flammea.

L. cinnabarinæ × *L. Pilcherii* ×

Plant of medium stature with somewhat slender one-leaved stems. Peduncles 5—10 or more flowered, flowers 4 inches across; sepals and petals spreading in a stellate manner, bright orange-yellow; lateral lobes of lip yellow streaked obliquely with red-purple; intermediate lobe red purple with a paler margin; disc yellow. Column whitish stained with red-purple below the stigmatic cavity.

Lælia flammea, Rehb. in Gard. Chron. I. (1874), p. 599. Id. V. (1876), p. 394. Fl. and Pomol, 1874, p. 133. Williams' Orch. Alb. V. t. 217.

Raised by Seden at our nursery. The most distinct and striking of all the hybrid Lælias yet raised as regards colour, which is unique even among orchids. Its robust peduncles produced by the stronger plants, and bearing 9—12 flowers each, are among the most splendid objects in the Cattleya-house in the spring months.

L. Philbrickiana.

Cattleya Aclandiae × *Lælia elegans*.

Flowers 4 inches in diameter; sepals and petals similar, olive-green toned with rose-purple, and sometimes sparingly spotted with blackish purple towards the tips; side lobes of lip pale rose suffused with white; middle lobe rich magenta-purple. Column rose-purple.

Lælia Philbrickiana, Rehb. in Gard. Chron. XII. (1879), p. 102.

Raised by Seden at our nursery, and dedicated to F. A. Philbrick, Esq., Q.C., of Oldfield, Bickley.

L. Pilcheriana.

Lelia crispa × *L. Perrini*.

Sepals and petals white, sometimes faintly flushed with pale rose-purple; side lobes of lip white with an amethyst-purple stain near the anterior margin on the inner side, and sometimes with a few purple streaks below it; middle lobe purple veined with maroon and bordered with pale lilac; disc yellowish streaked with purple.

Lelia Pilcheriana, Rehb. in Gard. Chron. 1868, p. 875. *Fl. Mag.* 1867, t. 340.

Raised by Dominy at our nursery, and named in compliment to Mr. Pilcher, formerly gardener to the late Sigismund Rucker, Esq., of West Hill, Wandsworth, and one of the most successful cultivators of orchids of his time.

L. Sedeni.

Cattleya superba × *Lelia elegans*.

Peduncles many flowered, flowers 4—5 inches in diameter; sepals and petals bright rose-purple; side lobes of lip pale purple bordered with magenta-purple; middle lobe deep velvety magenta-purple. Column white stained with purple.

Lelia Sedeni, Rehb. in Gard. Chron. VIII. (1877), p. 424.

Raised by Seden at our nursery. The only plant of this distinct hybrid is in the collection of Baron Schroeder at The Dell.

L. triophthalma.

Cattleya superba × *Lelia exoniensis* ×

Flowers 4—5 inches in diameter; sepals and petals rose-purple, much paler at the base; side lobes of lip white streaked obliquely with purple; middle lobe rich amethyst-purple, with a narrow white margin and yellow disc crossed transversely by a purple streak, the basal division similarly crossed longitudinally, giving the disc a tripartite appearance which suggested the name given to this hybrid.

Lelia triophthalma, supra. *Cattleya triophthalma*, Rehb. in Gard. Chron. XX. (1883), p. 526.

Raised by Seden at our nursery. A beautiful and remarkably distinct hybrid, of which two plants only were raised, that are now in the collections of Baron Schroeder and Hon. F. L. Ames respectively.

L. Veitchiana.

Cattleya labiata vera × *Lelia crispa*.

Peduncles 4—5 or more flowered; flowers 6—7 inches in diameter; sepals and petals pale rose-purple, the petals broader and more deeply colored than the sepals; side lobes of lip paler than the sepals; middle lobe magenta-purple with a narrow pale border and yellow disc streaked with red.

Lelia Veitchiana, Rehb. in Gard. Chron. I. (1874), p. 566.

Raised by Dominy at our nursery. "A noble offspring worthy of its noble parents."

Lindl. in Paxt. Fl. Gard. III. p. 155 (1853). Benth. et Hook. Gen. Plant. III. p. 532 (1883).

This is a small genus including three or four species, natives of the West India islands—principally Cuba and San Domingo, but of which only one, the typical species described below, is now known to be in cultivation. This comes near the Mexican *Lælia*s, *L. rubescens* and *L. albida*, but differs from them in its more crowded inflorescence of partially opened flowers, and especially in its pollinia, in which character it approaches *Tetramicra*.

Læliopsis domingensis.

Pseudo-bulbs ovoid, compressed, 2—3 inches long, diphylloous. Leaves oblong, obtuse, 4—5 inches long. Scapes slender, 15—18 inches long, pale purple, terminating in a branched panicle, but sometimes in a simple fascicle of 5—9 flowers. Flowers 2—2½ inches across when spread out; sepals linear-oblong, pale rosy mauve with purple veins and markings; petals oval-oblong, as broad again as the sepals, but coloured like them; lip broadly obovate, obscurely three-lobed, the lateral lobes convolute into a tube that is white externally and pale yellow within, the space between them traversed by fringed purple lines; the intermediate lobe open with fringed margin, rose-purple with deeper veins and markings. Column clavate, short; pollinia 8 in two series of four.

Læliopsis domingensis, Lindl. in Paxt. Fl. Gard. III. t. 105 (1853). Williams' Orch. Alb. V. t. 199. *Cattleya domingensis*, Lindl. Gen. et Sp. Orch. p. 118. *Bletia domingensis*, Rehb. Xen. Orch. II. p. 61.

Very little is recorded of the habitat of this orchid, or of its first discovery and introduction into British gardens. In the letter-press accompanying the plate in Paxton's *Flower Garden*, in which Dr. Lindley gives his reasons for separating this plant from *Cattleya* to which he had previously referred it, he adds:—"It was first found on trees in San Domingo by McKenzie; then Jaeger gathered it off branches of the Logwood tree, in woods near Moragone, where he saw it in flower in April." The date of introduction may be assigned to the year before its first flowering in this country, or about 1852. So few orchids of merit are found in San Domingo, together with the disturbed political state of the island, that collectors have been deterred from seeking, and horticultural firms from importing it; hence it is that so few plants of *Læliopsis domingensis* are to be seen in European orchid collections.

Cultural Note.—*Laeliopsis dominensis* may be grown in pans or baskets suspended near the roof glass, in the warmest part of the Cattleya-house, as, like the Mexican *Laelias*, it requires much light; when growing, water must be liberally supplied.

TETRAMICRA.

Lindl. Gen. et Sp. Orch. p. 119 (1831). Benth. et Hook. Gen. Plant. III. p. 532 (1833).

Includes some half a-dozen tropical American species that have been referred to almost as many different genera by different botanists, but by Reichenbach all lumped with *Laelia*, *Schomburgkia*, *Laeliopsis*, &c., under *Bletia*.* The genus would have received no notice here, but for one beautiful species, well known in gardens, under the name of *Leptotes bicolor*, which Mr. Bentham has brought under it.

Tetramicra (*Leptotes*) bicolor.

Rhizome creeping; stems terete, 1—1½ inches long, monophyllous; leaves fleshy, subcylindric, falcate, acute, 3—5 inches long, channelled on one side, dull deep green, sometimes glaucous, sometimes spotted with purple. Peduncle from base of leaf, 2—4 flowered; flowers on pale green pedicels (including ovary) 2 inches long; sepals and petals white, linear-oblong with reflexed margins; lip shorter than the other segments, oval-oblong with two-erect auricles at the base, purple, sometimes with a white border and tip. Column short; pollinia six, four superior and perfect, two inferior and much smaller.

Tetramicra bicolor, Benth. Gen. Plant. III. p. 533 (1833). *Leptotes bicolor*, Lindl. Bot. Reg. t. 1625 (1833). *Bot. Mag.* t. 3734 (1840). *L. serrulata*, Lindl. Sert. Orch. t. 11 (1838). *Bletia bicolor*, Rehb. Walp. Ann. VI. p. 438.

First introduced from the Organ mountains by Mrs. Arnold Harrison, of Liverpool, about the year 1831 or 32; it was afterwards sent by Gardner from the same region to the Woburn collection, where it flowered for the first time in February, 1839. The *Leptotes serrulata* of Lindley figured in his *Sertum Orchidaceum* is probably a geographical form of *L. bicolor*, which has an extensive range in southern Brazil.

Cultural Note.—Like most dwarf-habited orchids, *Tetramicra bicolor* should be grown in shallow pans or in teak baskets that can be suspended near the roof. An intermediate temperature with a liberal supply of water while growing, is the most suitable for it.

* Genus a Reichenbachio in Walp. Ann. VI. 438 ad *Bletiam* reducitur a qua nobis tam habitu quam characteribus distinctissimum videtur et *Cattleya Laeliisque* affinius. Gen. Plant. III. p. 533.

SCHOMBURGKIA.

Lindl. Sert. Orch. t. 10, 13 (1838). Benth. et Hook. Gen. Plant. III. p. 534 (1883).

About a dozen species of Schomburgkia are known to science, all natives of tropical North America, the West India Islands, and the Colombia-Guiana region of South America.

All the species described below are handsome, and some of them even of striking aspect, but the large size of the plants with their tall flower scapes that appear at irregular and uncertain intervals, have hitherto proved an obstacle to their finding favour amongst amateurs.

The most obvious generic characters are—the sepals and petals are equal or nearly so, and are more or less undulated; the lateral lobes of the lip are open, at least not convolute over the column; * the pollinia are eight in two series of four each; the stems or pseudo-bulbs are fleshy, usually of large size, often becoming hollow when old, generally fusiform, and bearing at their summits 2—3 leathery leaves, the higher number being the most common; the scapes are long and slender, with numerous joints, at each of which is a conspicuous sheathing bract; the flowers on long pedicels are arranged in a loose raceme or panicle at the extremity of a long scape. Structurally, Schomburgkia comes very near Lælia (especially the Guatemalian species, *L. superbiens*), and Sophronitis, so near indeed to the first-named genus, that Reichenbach has, in common with Lælia and Læliopsis, referred all the species to Bletia. From Sophronitis the Schomburgkias are easily distinguished by their larger size, as well as by some of the characters enumerated above.

The genus is dedicated to Dr. Richard Schomburgk, a distinguished botanist, who accompanied his brother, Sir Robert Schomburgk, as naturalist in the boundary expedition to British Guiana, in 1840—44, during which he discovered the typical species, *S. crispa*, and numerous other orchids till then unknown to science. Dr. Schomburgk has been for many years Director of the Botanic Garden, at Adelaide, South Australia.

Cultural Note.—*S. Lyonsii*, *S. Tibicinis* and *S. undulata* coming from regions of considerable elevation, where the rainfall is heavy for half the year, and drought with full exposure to the sun prevails during the remaining half, may be associated with the Mexican Lælias, and receive similar cultural treatment. *S. crispa* coming from the hot damp valley of the Essequibo requires a higher average temperature, as does *S. Humboldtii* from the coast region of Venezuela; these species, especially the latter, also require much direct sunlight to mature their stems, and to insure their flowering regularly.

* Exceptions to this are seen in *S. Humboldtii*, and in one or two other species.

Schomburgkia crispa.

Stems fusiform, angulate, 4—6 inches high, diphyllous. Leaves lanceolate, acute, 8—10 inches long. Scapes erect, upwards of a yard long. Flowers 2—2½ inches in diameter, on long white pedicels, in a dense terminal raceme; sepals and petals linear-oblong, much crisped at the margin, brownish yellow with deeper veins; lip oblong, with three raised central lines, obscurely three-lobed, pale rose-pink, deeper at the apex. Column clavate with a wing-like margin.

Schomburgkia crispa, Lindl. *Sert. Orch.* t. 10 (1838). *Bot. Reg.* 1844, t. 23. *Bot. Mag.* t. 3729 (marginata). *Bletia crispina*, Rehb. in *Xen. Orch.* II. p. 48.

Discovered by Dr. Schomburgk during his explorations in British Guiana, growing on the trunks of trees, along the banks of the rivers Essequibo and Berbico. It is the typical species upon which the genus was founded.

S. Humboldtii.

Rhizome as thick as a man's little finger. Pseudo-bulbs sub-cylindric, tapering upwards, 6—8 inches long, furrowed longitudinally, and with 2—3 depressed joints, di-triphyllous. Leaves oblong or oblong-cuneate, 6 inches long, very leathery. Scapes 3—4 feet long, paniculate, many-flowered. Flowers 2½—3 inches in diameter, on purplish pedicels; sepals and petals undulate, pale lilac, the former oblong, acute, the latter elliptic-oblong, tinted with amethyst-purple towards the apex; lip broadly oval, three-lobed, the side lobes triangular, enfolding the column, amethyst-purple on the exposed side; intermediate lobe spreading, deeply cleft on the anterior side, fringed and crisped at the margin, bright purple streaked with pale purple; disc yellow, traversed longitudinally by 5—7 lamellæ, which are deep purple towards the base of the lip. Column terete above, fluted below.

Schomburgkia Humboldtii, Rehb. *Xen. Orch.* I. p. 240. *Epidendrum Humboldtii*, *Id.* p. 160, t. 53. *Bletia Humboldtii*, *Id. Xen. Orch.* II. p. 58.

Discovered by Humboldt and Bonpland, in the beginning of the present century, near Puerto Cabello, in Venezuela, and subsequently gathered by Wagener in the same locality. Although introduced into British orchid collections some years ago, we find no evidence of its having flowered in any of them till the present year (1887), when specimens were kindly sent to us by Messrs. Backhouse, of York. It is a very handsome species, with flowers of the structure and aspect of those of a *Laelia*.

S. Lyonsii.

Pseudo-bulbs fusiform, attenuated below, 6—8 inches long, diphyllous. Leaves linear-oblong, 10—12 inches long. Scapes upwards of a yard long, with the bracts much reflexed, and terminating in a 10—15 flowered

raceme. Flowers 2 inches in diameter, white spotted with purple; sepals oblong lanceolate; petals broader, ovate-oblong, acute; lip reflexed, ovate-oblong, acute, with five raised longitudinal lines. Column short, curved, swollen at the base, bidentate at the apex.

Schomburgkia Lyonsii, Lindl. in Gard. Chron. 1853, p. 615. *Bot. Mag.* t. 5172.
Bletia Lyonsii, Rehb. Xen. Orch. II. p. 47.

One of the prettiest, and, at the same time, one of the rarest of the genus. It was first brought under the notice of Dr. Lindley by Mr. J. C. Lyons, of Ladiston, near Mullingar, who believed he had received his plant from Rev. John Clowes, but nothing was known of its origin at that time. Subsequently Dr. Lindley saw in Dr. Alex. Prior's herbarium, a native specimen which that gentleman had gathered from the trunk of a tree, brought down from the hills in St. Anne's parish, Jamaica.* Our description was taken from a plant in the collection of Capt. Dymonds, Brooklands, Dorchester, who believes it to have been sent from Honduras some years previously.

S. *Thomsoniana*.

Flower only seen by us. Pseudo-bulbs, leaves, and inflorescence as in *S. Tibicinis*, but smaller.† Sepals and petals linear-oblong, $1\frac{1}{2}$ inches long, the petals a little narrower than the sepals, cream-white at the base, passing to buff-yellow at the apex, the sepals simply undulate, the petals crisped. Lip three-lobed, the side lobes triangular, rolled over the column, white on the exposed side; the middle lobe oblong, emarginate, much crisped, deep maroon-purple; disc yellow traversed by five raised lines which extend to the base of the lip, and of which the two outside ones are the broadest; in the central area between the side lobes, these raised lines are deep purple, and from which on either side are numerous oblique purple streaks. Column triquetral, bent, bidentate at apex, pale green.

Schomburgkia Thomsoniana, Rehb. in Gard. Chron. II. s. 3. (1887), p. 38.

A species new to science and to horticulture that has recently flowered in the collection of Mr. W. J. Thomson, at St. Helen's, Lancashire. Nothing is recorded of its origin.

S. *Tibicinis*,

Stems subcylindric, obscurely angulate, ringed, tapering upwards, 9—18 inches long, di—triphyllous. Leaves spreading, oval-oblong, emarginate, or obtuse, 6—9 inches long, leathery. Scapes 7—10 feet high (usually less

* Bot. Mag. sub. t. 5172.

† Fide Rehb. Gard. Chron. loc. cit.

under cultivation), mottled green and purple, sometimes racemose, sometimes paniculate at the extremity. Flowers 2—3 inches across vertically, on purple pedicels $1\frac{1}{2}$ —2 inches long; sepals and petals oblong, obtuse, the petals somewhat narrower than the sepals, and more undulate, red-brown, much paler at the base; lip oblong, three lobed, the side lobes large, roundish, orange-yellow streaked with red-purple, with a pale yellow central line and white border on the inner side, rose-purple beneath; the middle lobe much smaller, sub-rhomboid, emarginate, white with a yellow stain on the disc and pale purple margin. Column thick, triquetral, white stained with purple.

Schomburgkia Tibicinis, Batem. *Orch. Mex. et Gaua.* t. 30 (1843). *Bot. Reg.* 1845, t. 30. *Bot. Mag.* t. 4476. Williams' *Orch. Alb.* V. t. 205. *Bletia Tibicinis*, Rchb. *Xen. Orch.* II. p. 58.



Schomburgkia Tibicinis.
(From *The Gardening World*).

First discovered by Mr. G. Ure Skinner on the highlands of Honduras, where it is plentiful; it is also said to occur sparingly in the neighbourhood of Oaxaca, in Mexico, in Costa Rica, Guatemala, and other localities in central America. It was introduced by its discoverer to Mr. Bateman's collection, at Knypersley, in 1836, but did not flower till four years afterwards. The specific name, *Tibicinis**, the trumpeter's, or more classically, the fifer's *Schomburgkia*, refers to the practice of

* From *Tibicen*, a player on the *tibia*; the *tibia* in its commonest form was simply the section of a reed (probably *Arundo Donax*) perforated with holes at the proper distances.

the Indians of making the old hollow stems serve as horns; these stems are also frequently the abode of colonies of ants, which rarely fail to inflict a severe chastisement upon him who ventures to disturb them.

S. undulata.

Pseudo-bulbs fusiform, attenuated below, 9—12 inches long, di-(rarely tri-)phyllous. Leaves oblong, 6—9 inches long. Scapes 2—3 feet long, usually racemose at the extremity. Flowers $1\frac{1}{2}$ inches in diameter, on pale purple pedicels (including ovary), 3 inches long; sepals and petals linear-oblong, much undulated, deep vinous red, shaded with brown; lip three-lobed, the side lobes oblong, erect, pale rose; the middle lobe spreading, cordate, apiculate, purple, with a white disc traversed longitudinally by five raised lines. Column broad, purple.

Schomburgkia undulata, Lindl. Bot. Reg. 1844, misc. 21. Linden's Proc. t. 32 (1860). Warner's Sel. Orch. II. t. 21. *Bletia undulata*, Rehb. Xen. Orch. II. p. 49.

Discovered by Linden, in 1841, upon rocks, near Truxillo, in Venezuela; by the same traveller, near the natural bridge of Icononzo, in New Granada, at 2,000 feet elevation; and subsequently by Wagener, near Caracas. It flowered for the first time in Europe, in Mr. Rucker's collection at West Hill, Wandsworth, in 1844.

SOPHRONITIS.

Lindl. in Bot. Reg. t. 1129 (1827). Benth. et Hook. Gen. Plant. III. p. 535 (1833).

This is a genus of dwarf epiphytes, with small pseudo-bulbs clustered on the rhizome, each bearing a solitary coriaceous leaf, and slender terminal peduncle that is usually one (rarely two or more) flowered. The essential characters that chiefly distinguish the flowers from those of other genera are:—

The erect labellum, which is sessile on the base of the column, or shortly adnate to it.

The short moderately thick column, with a sub-petaloid wing on each side of the stigmatic cavity.

The two-celled anther, in which eight pollinia are arranged in two series of four each.*

The spindle-shaped obscurely angulate capsule, about an inch long.

Three well defined species are at present known, all found on the Organ mountains, situate about 60 miles from Rio de Janeiro,

* The pollinary apparatus of *Sophronitis violacea* deviates from the type in some of its structural details.

and where they were gathered by Gardner during his botanical expedition to Brazil, 1836-41, but two of which had been discovered many years before. They occur at elevations of 4,000—5,000 feet, where "the climate is much cooler than at Rio, the thermometer in the months of May and June falling as low as 0° C. (32° F.), just before sunrise. The hottest months are January and February, when the highest observed temperature at noon was 29° C. (84° F.); this is also the season of heaviest rains, and when violent thunderstorms occur almost daily; they come on with great regularity, about four p.m., and when they pass over, leave a delightfully cool evening."*

The name *Sophronitis* is from the Greek word *σωφρων* (sōphrōn), "modest," a name fairly applicable to the type species *S. cernua*, but scarcely so to *S. grandiflora*,

Cultural Note.—All the Sophronites, on account of their dwarf clustered habit, should be cultivated either in shallow pans or upon blocks of wood that can be easily suspended from the roof glass; the former are generally preferred on account of the labour saved in watering. An inch thick of peat and sphagnum compost is sufficient for the plants to root in, below which there should be free drainage. During the season of growth the temperature of the coolest part of the intermediate house with frequent waterings will meet the requirements of the plants. When growth is completed, they must be removed to the cool house, where they may remain during the flowering season, which usually lasts from November to March, and even later. The *rationale* of this treatment is easily deducible from what is stated above, but many amateurs keep their Sophronites in the cool house all the year round, and successfully flower them there.

Sophronitis cernua.

Pseudo-bulbs sub-cylindric, $\frac{1}{2}$ inch long. Leaves leathery, oval-oblong, obtuse, 1 inch long. Peduncles 2—3 or more flowered. Flowers bright cinnabar-red, with base of lip and column orange-yellow; sepals elliptic, acute; petals ovate, broader and more brightly coloured; lip ovate, acuminate, partly convolute over the column at the base.

Sophronitis cernua, Lindl. in Bot. Reg. t. 1129 (1827). Bot. Mag. t. 3677 (1839).

The type species upon which Lindley founded the genus. It was discovered by Mr. William Harrison, a Liverpool and Brazilian merchant, growing upon trees at Botafogo, near Rio de Janeiro, and by him transmitted to his relative, Mrs. Arnold Harrison, at Aigburth, near Liverpool, in whose stove it flowered in 1826.

* Gardner's Travels in Brazil, p. 47.

S. grandiflora.

Pseudo-bulbs fusiform, about an inch long, but sometimes ovoid and shorter. Leaves oblong-lanceolate, $2\frac{1}{2}$ —3 inches long, shortly petiolate or sessile. Peduncles as long as the leaves, one-(rarely two-)flowered. Flowers $1\frac{1}{2}$ —2 inches in diameter, brilliant scarlet, with the base and side lobes of the lip orange-yellow streaked with scarlet; sepals elliptic-oblong; petals oval, as broad again as the sepals; lip three-lobed, the side lobes erect or partially enfolding the column, the middle lobe oblong, acute, concave. Column white.

Sophronitis grandiflora, Lindl. Sert. Orch. sub. t. 5 (1838). *Bot. Mag.* t. 3709 (1839). *Paxt. Mag. Bot.* IX. p. 194 (1842). Van Houtte's *Fl. des Serres*, I. p. 49 (1845). Hook. *Cent. Orch.* t. 41 (1849). Warner's *Sel. Orch.* III. t. 3 (two forms). Jennings's *Orch.* t. 5. De Puydt. *Les. Orch.* t. 41. *S. coccinea*, Van Houtte's *Fl. des Serres*, t. 1716 (1867). Rehb. Walp. Ann. VI. p. 465. *Cattleya coccinea*,* Lindl. Bot. Reg. sub. t. 1919 (1836). *Sophronitis militaris*, Rehb.

var.—*purpurea*.

Pseudo-bulbs shorter and thicker; leaves elliptic, shorter than in the common form; flowers of a uniform bright carmine-purple.

S. grandiflora purpurea, supra. *S. purpurea*, Rehb. in *Gard. Chron.* IX. (1878), p. 462.

Sub-var.—*rosea*, pseudo-bulbs and leaves as in the variety *purpurea*; flowers bright rose-purple (*The Garden*, XXV. (1884), t. 443).

Sophronitis grandiflora, the *facile princeps* of the genus, was introduced to British gardens by Gardner, who sent plants to Messrs. Loddiges' nursery, at Hackney, where they flowered for the first time in October, 1841. It had been discovered many years before by the French naturalist, Descortilz, who found it upon the high mountains that separate Bananal, from Ilha Grande. Gardner's plants were gathered on the Organ mountains, where the species is abundant, and where all recent importations have been collected. Among them several sub-varieties have appeared, the most distinct being those described above; *purpurea* first appeared in Hofrath Keil's garden, at Leipzig, about the year 1850; † *rosea*, which differs from it in colour only is a recent acquisition; the *S. coccinea* of British gardens has flowers of a deeper scarlet than the type. The flowering season of *S. grandiflora* is from November to February, and even later.

* We have no doubt that this is the same species as *Sophronitis grandiflora*, and thence the earliest published description known to us; the specific name *coccinea* has therefore priority of publication. Nevertheless, the generally accepted name has become so firmly established in garden nomenclature that we are reluctant to disturb it, especially as it is the most applicable of the two to this species, *coccinea* being as suitable for *S. cernua* as for *S. grandiflora*. Amongst the immense importations of *S. grandiflora* of late years, it is not surprising that deviations from the type, otherwise than in colour, should have been observed; but in every case that has come under our notice, these deviations are of too trivial a nature to admit of specific characters being framed from them, and we cannot but regard such so-called species as *S. coccinea*, *S. militaris*, &c., as synonyms of *S. grandiflora*.

† Rehb. in *Gard. Chron.* IX. (1878), p. 462.

S. violacea.

Rhizome slender, creeping; pseudo-bulbs ovoid, about an inch long, fluted in parallel lines, and, when newly imported, coated with white sheaths. Leaves 2–3 inches long, linear, with a depressed mid-vein, keeled beneath. Peduncles shorter than the leaves, 1–2 flowered. Flowers $\frac{3}{4}$ — $1\frac{1}{4}$ inch in diameter, violet-magenta with a paler centre; sepals and petals similar and sub-equal, oblong-lanceolate; lip obovate, broader than the petals.

Sophronitis violacea, Lindl. Bot. Reg. 1840, misc. 18. Paxt. Fl. Gard. III. p. 11. (1852). Bot. Mag. t. 6880.

Discovered by Gardner, in 1837, on the Organ mountains, where it is said to be common, and whence it has been frequently imported with *S. grandiflora*. It flowers in the winter months.

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This work received the award of a Diploma at the International Forestry Exhibition at Edinburgh, 1884.

It has also received the highest encomiums of the Horticultural Press of this country, and also of the Continents of Europe and America, as being trustworthy, practical, scientific, and indispensable to those having an intelligent interest in Coniferous trees. It is constantly referred to as being the standard work on the subject; it has been translated into Italian by Signor Sada, of Milan, and into French for a well-known horticultural publisher in Paris.

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